



State of Washington  
**Department of Fish and Wildlife**

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July 28, 2011

Dear Interested Parties:

The Washington Department of Fish and Wildlife (WDFW) has published a Final Environmental Impact Statement (FEIS) titled: Final Environmental Impact Statement (EIS) for the Wolf Conservation and Management Plan for Washington. The plan has been developed to guide recovery and management of gray wolves as they naturally disperse into the state and reestablish a breeding population.

The Recommended Wolf Conservation and Management Plan will be provided to the Washington Fish and Wildlife Commission for consideration at their August 4, 2011 meeting in Olympia, Washington.

The Agenda for that meeting is found on the following link:

[http://wdfw.wa.gov/commission/meetings/2011/08/agenda\\_aug0411.html](http://wdfw.wa.gov/commission/meetings/2011/08/agenda_aug0411.html).

The Commission has scheduled three more special meetings to discuss the recommended Wolf Conservation and Management Plan and take public comment. Those meetings are tentatively scheduled for Aug. 29 in Ellensburg, and Oct. 6 and Nov. 3 in Olympia. Final action on the plan is expected to occur at the December 2011 Commission meeting.

The Draft EIS underwent public review from October 5, 2009 to January 8, 2010. Nearly 65,000 people provided comments on the plan. With consideration of all comments received, WDFW has prepared this Final Environmental Impact Statement in compliance with the State Environmental Policy Act (SEPA) and other relevant state laws and regulations.

## **MAJOR CONCLUSIONS**

This is a phased non-project review proposal. Phased review allows agencies and the public to focus on issues that are ready for decision and excludes from consideration issues that are already decided or are not yet ready.

The wolf is listed as an endangered species by the State of Washington, and the Wolf Conservation and Management Plan serves as the state recovery plan for the species. The goals of the plan are to: (1) restore the wolf population in Washington to a self-sustaining size and geographic distribution that will result in wolves having a high probability of persisting in the state through the foreseeable future, (2) manage wolf-livestock conflicts in a way that minimizes livestock losses, while at the same time not negatively impacting the recovery or long-term perpetuation of a sustainable wolf population, (3)

maintain healthy and robust ungulate populations in the state that provide abundant prey for wolves and other predators as well as ample harvest opportunities for hunters, and (4) develop public understanding of the conservation and management needs of wolves in Washington, thereby promoting the public's coexistence with the species.

## **AREAS OF CONTROVERSY AND UNCERTAINTY**

*Recovery Objectives* – the plan establishes recovery objectives to achieve a self-sustaining population, distributed throughout a significant portion of the historic range in the state, per WAC 232-12-297 (Endangered, threatened, and sensitive wildlife species classification). Fifteen breeding pairs, which represent an estimated 97-361 wolves, are considered minimal to achieve recovery. Several components of the delisting objectives serve to reduce the risk to long-term viability of a wolf population in Washington, including: the geographic distribution requirements across three recovery regions, the use of successful breeding pairs as a measurement standard, and a three-year requirement for maintaining population robustness on the landscape. The WDFW also conducted a modeling analysis of the delisting objective to test persistence on the landscape. Results indicated that the population would persist, as long as it was allowed to grow and was not limited at that number.

*Wolf-livestock conflict management* – addressing and reducing wolf-livestock conflicts is an important part of the plan. The plan includes both proactive, non-lethal (e.g., modified husbandry methods and non-lethal deterrents) and lethal management options to address wolf-livestock conflicts. The plan emphasizes prompt response to reported depredations and includes a program to compensate livestock producers for livestock killed or injured by wolves.

*Wolf-ungulate conflict management* – ungulates are the natural prey of wolves. The plan includes management options to address localized impacts to ungulate populations, if they occur. If WDFW determines that wolf predation is a primary limiting factor for an “at-risk” ungulate population, and the wolf population in that wolf recovery region is healthy, WDFW may consider reducing wolf abundance in the localized area occupied by the ungulate population. Management options would include both non-lethal and lethal measures; with non-lethal options prioritized while the species is listed.

WDFW believes this FEIS will assist decision makers to identify the key environmental issues and options associated with this action. Comments received from agencies and interested parties during public review of the draft document have been considered and incorporated into this final EIS. WDFW thanks all of those who comments and input into this process.

Sincerely,



Bob Zeigler  
SEPA/NEPA Coordinator  
Agency Responsible Official  
Protection Division  
Habitat Program

FINAL  
Environmental Impact Statement (EIS)  
for the  
Wolf Conservation and Management Plan  
for Washington

LEAD AGENCY

Washington Department of Fish and Wildlife  
Wildlife Program  
600 Capitol Way N  
Olympia, Washington

July 28, 2011



## Fact Sheet

**Title:** Final Environmental Impact Statement (EIS) for the Wolf Conservation and Management Plan for Washington

**Description:** This is a non-project review proposal. Wolves were classified as endangered in Washington under federal law in 1973 and under state law in 1980. They were federally delisted in the eastern third of Washington in 2011; and remain federally listed in the western two-thirds of the state and state listed throughout Washington. As of July 2011, Washington had five confirmed wolf packs. Continued population growth in Washington is expected as a result of dispersal of wolves from existing packs and from wolf populations in Idaho, Montana, Oregon, and British Columbia.

The Washington Department of Fish and Wildlife (WDFW) initiated development of a state wolf conservation and management plan in 2007 in response to: increasing wolf dispersal and pack establishment in the state; requirements under WAC 232-12-297 to develop recovery plans for listed species; and the anticipated eventual return of all wolf management to the state. A determination of significance and request for comments on the scope of an environmental impact statement (EIS) was issued August 1, 2007 and seven public scoping meetings were held around the state. Also in 2007, WDFW appointed an advisory Wolf Working Group comprised of 17 citizens to provide recommendations on the plan to the Department. The Draft EIS/Wolf Conservation and Management Plan for Washington was completed in 2009.

Following the requirements of the State Environmental Policy Act (SEPA), the Draft EIS was made available for public review on October 5, 2009 for a 95-day public comment period. During the review period, WDFW held 12 public meetings across the state in October and November 2009. These meetings were attended by 1,157 people with 229 people providing comments on the plan. Nearly 65,000 people provided email and written comments on the Draft EIS. A blind peer review was also conducted during that time and WDFW received comments from 3 scientific peer reviewers. WDFW addressed the public input and met with the Working Group in June 2011 for review and comment on the proposed changes, and then produced the Final EIS/Recommended Plan. Responses to the comments received are included in the Final EIS.

The Final EIS incorporates recommendations and suggestions from public comments, peer review comments, WDFW reviews and the Wolf Working Group recommendations. The Preferred Alternative Final Recommended Wolf Conservation and Management Plan was developed as a result of the alternatives studied. The plan will serve as the state recovery plan for the wolf in Washington. As such, it establishes recovery objectives for downlisting and delisting the wolf in the state, per WAC 232-12-297, and identifies strategies to address conflicts and achieve recovery.

1 A decision on adoption of the Wolf Conservation and Management Plan by the Washington Fish  
2 and Wildlife Commission is expected at the December 2011 meeting. Prior to that, the Commission  
3 will hold workshops and discussions on the plan in August, October, and November 2011.

4 **Location:** Statewide

5  
6 **Proponent and Lead Agency:**

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25  
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29 Rob Wielgus.

30  
31 **Wolf Working Group:**

32 In 2007, former WDFW Director Koenings appointed a group of 17 citizens to provide  
33 recommendations to the Department to assist in development of the plan. The names and  
34 affiliations of members are shown in Appendix B of this document.

35  
36 **Date Draft Environmental Impact Statement (DEIS) was issued:** October 5, 2009.  
37 Comments were taken through January 8, 2010.

38  
39 **Date Final Environmental Impact Statement (FEIS) is issued:** July 28, 2011  
40

**Public meetings on the Draft EIS :** Public meetings were held during October – November 2009 at the following locations: Clarkston, Richland, Yakima, Colville, Spokane, Vancouver, Aberdeen, Seattle, Mount Vernon, Sequim, Omak, and Wenatchee, Washington.

**Date Final Action is Planned:** The Final EIS/Recommended Wolf Conservation and Management Plan for Washington will be presented to the Washington Fish and Wildlife Commission on August 4, 2011. Commission review will occur during August-November, and decision-making will occur at the December 2011 meeting.

**Date of Next Action and Subsequent Environmental Reviews:** The Final Environmental Impact Statement (FEIS) is a phased non-project action. The Recommended Wolf Conservation and Management Plan will be provided to the Washington Fish and Wildlife Commission for consideration at their August 4, 2011 meeting in Olympia, Washington.

The Agenda for that meeting is found on the following link:

[http://wdfw.wa.gov/commission/meetings/2011/08/agenda\\_aug0411.html](http://wdfw.wa.gov/commission/meetings/2011/08/agenda_aug0411.html). The Commission has scheduled three more special meetings to discuss the recommended Wolf Conservation and Management Plan and take public comment. Those meetings are tentatively scheduled for Aug. 29 in Ellensburg, and Oct. 6 and Nov. 3 in Olympia. Final action on the plan is expected to occur at the December 2011 Commission meeting.

**Notice of Availability:** The Final EIS is available for download on WDFW's website at:

[http://wdfw.wa.gov/licensing/sepa/sepa\\_final\\_docs\\_2011.html](http://wdfw.wa.gov/licensing/sepa/sepa_final_docs_2011.html) .

The complete public comments on the Draft EIS can be viewed at:

[http://wdfw.wa.gov/conservation/gray\\_wolf/comments.html](http://wdfw.wa.gov/conservation/gray_wolf/comments.html)

**Distribution List:** Notice of the availability of this FEIS is posted on the WDFW SEPA website at: [http://wdfw.wa.gov/licensing/sepa/sepa\\_final\\_docs\\_2011.html](http://wdfw.wa.gov/licensing/sepa/sepa_final_docs_2011.html) . Copies have been sent to local government planning departments (city and county); affected Tribes; all state and federal agencies with jurisdiction and interested parties.

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## Executive Summary

A Final Environmental Impact Statement (EIS), with a Preferred Alternative Recommended Wolf Conservation and Management Plan for Washington has been developed. The purpose of the plan is to ensure the reestablishment of a self-sustaining population of gray wolves in Washington and to encourage social tolerance for the species by addressing and reducing conflicts. The plan serves as the state recovery plan for the species per WAC 232-12-297. Pursuant to the State Environmental Policy Act (SEPA) process, a Draft EIS was prepared in 2007-2009 which evaluated four alternatives, including a no action alternative. Other alternatives were considered but not studied in detail because they did not meet the purpose and need of the plan. The Draft EIS for the wolf plan established recovery objectives for downlisting and delisting the species, and identified strategies to address conflicts and achieve recovery.

The Draft EIS was made available for a 95-day review period. WDFW received written and email comments on the Draft EIS/ Plan from nearly 65,000 people. A scientific peer review was also conducted during this period, with 3 anonymous peer reviewers submitting comments. The Final EIS/Recommended Plan was modified as a result of the comments received on the Draft EIS/Plan, scientific peer review, WDFW review, and WDFW Wolf Working Group review.

The Final EIS evaluates the four alternatives, including the revised Preferred Alternative. The alternatives vary in how conservation of wolves in Washington could be accomplished and how conservation and management would be balanced. These included differences in the geographic distribution of recovery objectives, numbers of recovery areas, management options to address conflicts, and compensation for livestock depredation. Alternative 3 placed the greatest emphasis on protection and restoration of wolves in Washington, but had fewer management options for addressing wolf-livestock conflicts. Alternative 1 had a lower standard for protection and restoration of wolves in the state and a more aggressive lethal control strategy. Alternative 4 (the No Action Alternative) emphasized protection and restoration of wolves using existing programs, but did not develop a conservation and management plan. As a result, wolves would continue to be listed as endangered until a state recovery plan was completed that established recovery objectives.

Alternative 2, the wolf conservation and management plan, is the Preferred Alternative because it meets the goals and objectives for establishing a long-term viable wolf population in Washington while at the same time addressing wolf-livestock conflicts and interactions between wolves and wild ungulates. The Final Preferred Alternative was modified from its previous version in the Draft EIS based on the public, scientific, and agency reviews and input.

Changes to the Preferred Alternative include:

- The distribution of breeding pairs among recovery regions was changed from the Draft to the Final EIS Preferred Alternative. Pairs that could have occurred anywhere in the state

for downlisting to Sensitive Status and delisting were assigned to specific recovery regions. For downlisting to sensitive status, 3 breeding pairs that could have occurred anywhere in the state were assigned to the Eastern Washington and Northern Cascades recovery regions. For delisting, 6 breeding pairs that could have occurred anywhere in the state were assigned among the three recovery regions.

- Lethal take by livestock owners of wolves caught in the act of attacking livestock on private lands they own or lease was changed to allow it to occur at all listed statuses, rather than only after reaching threatened status, with a permit from WDFW and after documented depredation had occurred in the area and measures to resolve the problem had been deemed ineffective.
- Lethal take by private citizens of wolves in the act of attacking pet dogs was previously allowed when wolves reached Sensitive status; in the revised Preferred Alternative, it is not allowed while wolves are listed.
- Management of wolf-ungulate conflicts was changed. In the Draft Preferred Alternative, the WDFW could consider moving, lethal control, or other control techniques for wolves in localized areas after wolves were delisted, if research determined that wolf predation was a limiting factor for an at-risk ungulate population. In the Final Preferred Alternative, the WDFW could consider control of wolves at all listing statuses if it determines that wolf predation is a primary limiting factor for an at-risk ungulate population, and the wolf population exceeds delisting objectives within that recovery region. WDFW would consider the status of wolves statewide as well as within a specific recovery region where ungulate impacts were occurring in decision-making. The definition of an “at risk ungulate population” was revised from the Draft EIS to the Final EIS.

The Final EIS includes an analysis of the possible environmental effects of the four alternatives, including the revised Preferred Alternative 2.

Translocation (moving animals from one recovery region in Washington to another for the purpose of establishing a new population) is a conservation tool in the plan that may be used to establish a wolf population in a recovery region that wolves have not colonized through natural dispersal.

To build public tolerance for wolves, the wolf conservation and management plan outlines a range of proactive, non-lethal options and lethal management options for addressing wolf-livestock conflicts. Implementation of these would be based on the status of wolves to ensure that recovery objectives are met. Non-lethal management will be emphasized while the species is recovering and will transition to a broader range of approaches as wolves progress toward a delisted status.

The plan also includes a program to compensate livestock producers for livestock losses due to wolves. Compensation will be paid for confirmed and probable wolf losses using a two-tiered system, which also factors in the size of the land parcel being grazed.

1 The effects that wolves will have on elk, deer, and other ungulate populations and hunter harvest are  
2 difficult to predict, but observations from neighboring states suggest that statewide effects will be  
3 low, especially during recovery phases. As wolf numbers increase in Washington, there may be  
4 localized impacts on ungulate abundance or habitat use. Improved habitat management, flexibility  
5 in harvest strategies, and greater prevention of illegal hunting are recommended as measures for  
6 sustaining healthy ungulate populations that will support wolves and maintain harvest opportunities.  
7 Management options are included to address wolf predation on ungulates if they are found to be a  
8 primary limiting factor for an at- risk ungulate population.

9 Implementation of a public outreach and education program is a high priority for aiding wolf  
10 recovery. The Final Preferred Alternative includes strategies for outreach, including the distribution  
11 of information about wolves, living with wolves, preventing and addressing conflicts with livestock  
12 and dogs, and wolf-ungulate interactions. It also identifies a task to conduct public attitude and  
13 knowledge surveys to determine information needs and develop an outreach plan.

14

## 1. Introduction

Wolves were classified as endangered in Washington under federal law in 1973 and under state law in 1980. They were federally delisted in the eastern third of Washington in 2011; and remain federally listed in the western two-thirds of the state and state listed throughout Washington. As of July 2011, Washington had five confirmed wolf packs. Continued population growth in Washington is expected as a result of dispersal of wolves from existing packs and from wolf populations in Idaho, Montana, Oregon, and British Columbia.

The Washington Department of Fish and Wildlife (WDFW) initiated development of a state wolf conservation and management plan in 2007 in response to: increasing wolf dispersal and pack establishment in the state; requirements under WAC 232-12-297 (Appendix A) to develop recovery plans for listed species; and the anticipated eventual return of all wolf management to the state. A determination of significance and request for comments on the scope of an environmental impact statement (EIS) was issued August 1, 2007; and seven public scoping meetings were held around the state. Also in 2007, WDFW appointed an advisory Wolf Working Group comprised of 17 citizens (Appendix B) who provided recommendations on the plan to the Department. The Draft EIS/Wolf Conservation and Management Plan for Washington was completed in 2009; and the Final EIS/Plan was completed in 2011.

## 2. Background

### 2.1. State Environmental Policy Act Process Overview

The Washington Department of Fish and Wildlife (WDFW) recognizes the importance of the State Environmental Policy Act (SEPA) in the process of developing a wolf conservation and management plan for the state. The environmental impact statement (EIS) process provides opportunities for other agencies, stakeholders, tribal governments, and the public to participate in analyzing information and alternatives. This process, as detailed in WAC 197-11-440, helps ensure that WDFW understands the environmental consequences of its decisions and considers mitigation of probable significant adverse environmental impacts when making decisions. A checklist of subjects, detailed in WAC 197-11-444, must be addressed in the analysis (Appendix C). The SEPA process is being used for the development of a wolf conservation and management plan for Washington to ensure public input into the plan. Key steps in the EIS process include:

1. Scoping
2. Preparing a draft EIS, which analyzes the probable impacts of a proposal and reasonable alternatives
3. Issuing a draft EIS for review and public comment
4. Preparing a final EIS, which includes analyzing and responding to comments received on the draft EIS
5. Issuing a final EIS
6. Using the final EIS in decision-making.

Steps 1-3 were completed during 2007-2010. This document continues the process with steps 4-6: analysis of the comments for inclusion in the final EIS, preparation and release of the final EIS, and use of the final EIS in decision-making regarding adoption of the plan for Washington.

### 2.2. Scoping

Scoping initiates public involvement in the SEPA process. Its three purposes are to:

- Narrow the focus of the EIS to significant environmental issues;
- Eliminate insignificant impact issues or those not directly related to the proposal; and
- Help identify reasonable alternatives, consistent with the purpose and need of the proposed action, to be analyzed in the EIS.

The scoping process alerts the public, the project proponent, and the lead agency to areas of concern and potential controversy early in the process. Here, WDFW is both the project proponent and the lead agency. The SEPA process for the wolf conservation and management plan was formally initiated in August 2007. A 30-day scoping notice was sent on August 1, 2007 via mailings

to state resource agencies, federal agencies, counties, cities, and tribes; a news release; and posting on the WDFW website to solicit input on issues and alternatives that should be considered in development of the plan. In addition, seven public scoping meetings were held between August 14-23, 2007 in Spokane, Clarkston, Yakima, Twisp, Sequim, Bellingham, and Vancouver, Washington, to solicit input. A total of 311 people attended the meetings and provided comments on wolf conservation, wolf population objectives, wolf-livestock conflicts, wolf-game species interactions, wolf-human interactions, and a variety of related issues (Appendix D).

In addition to the formal scoping process, the WDFW Director appointed a Wolf Working Group in early 2007 to advise and provide recommendations to WDFW on the preparation of the draft wolf conservation and management plan. The group was comprised of 18 members (later reduced to 17) that represented both a broad range of perspectives and values on wolf conservation and management in Washington and the geographic scope of the state. The group met eight times over a 15-month period from February 2007 to May 2008 to develop recommendations that balanced wolf conservation and management. WDFW considered these recommendations as it developed the draft plan for scientific peer review. Following scientific peer review, WDFW met with the group again for a ninth meeting in September 2009 to solicit additional input on how the scientific peer review and WDFW comments were addressed in the revised draft plan.

## 2.3 Preparation and Issuing the Final EIS

Nearly 65,000 people provided comments on the Draft EIS/Wolf Conservation and Management Plan for Washington. WDFW hosted 12 public meetings across the state in October and November, 2009 that were attended by 1,157 people with 229 people providing comments on the plan. Three anonymous scientific peer reviewers provided comments to WDFW on the draft plan (Appendix E). In addition, WDFW staff analyzed and responded to public and peer review comments (Appendix F). After making modifications to the plan, WDFW held a tenth meeting with the Wolf Working Group in June 2011 for their review and comments on the proposed changes. The Working Group provided additional comments on the proposed changes to the plan.

Consideration of the public comments, scientific peer reviews, Wolf Working Group comments, and WDFW reviews resulted in modifications or additions to the Draft EIS Preferred Alternative 2. After reviewing and responding to public comments, WDFW produced the Final EIS/Recommended Plan for consideration by the Washington Fish and Wildlife Commission.

The Final EIS provides decision-makers with the information needed to make an informed decision on adoption of a final wolf conservation and management plan for the state of Washington that meets the requirements of WAC 232-12-297 for a recovery plan (Appendix A). The Final EIS/Recommended Plan will be presented to the Washington Fish and Wildlife Commission on August 4, 2011 for consideration. Commission review will occur from August through November 2011. Final action on the plan is expected at the December 2011 meeting. Upon approval of the final plan, WDFW will adopt it as the state recovery plan for the species (per WAC 232-12-297) and use

1 it to guide the implementation of conservation and management measures to achieve the eventual  
2 recovery and delisting of the gray wolf in Washington.

## 4 **2.4. Non-Project Proposal**

6 The wolf conservation and management plan (hereafter referred to as “the plan” or Preferred  
7 Alternative 2) is considered to be a “non-project action” under SEPA (WAC 197-11-442). Non-  
8 project actions include the adoption of plans, policies, programs, or regulations containing standards  
9 that will guide future actions. The probable significant adverse environmental impacts analyzed in a  
10 non-project EIS are those impacts foreseeable at this stage, before specific project actions are  
11 planned. If more specific actions are needed in the future, management decisions will be guided by  
12 the policies developed during this process.

## 14 **2.5. Purpose and Need for the Non-Project Action**

### 16 **2.5.1. Purpose**

17 The purpose of the wolf conservation and management plan is to ensure the reestablishment of a  
18 self-sustaining population of gray wolves in Washington and to encourage social tolerance for the  
19 species by reducing and addressing conflicts.

### 21 **2.5.2. Need**

22 Gray wolves were formerly common throughout most of Washington, but they declined rapidly  
23 between 1850 and 1900. The primary cause of this decline was the killing of wolves by Euro-  
24 American settlers as ranching and farming activities expanded. They were essentially eliminated as a  
25 breeding species from the state by the 1930s. Wolves were classified as endangered in Washington  
26 at the federal level in 1973 and at the state level in 1980. They were delisted under federal law in  
27 2011 in the eastern third of Washington, and remain federally listed in the western two-thirds of the  
28 state, and state-listed throughout Washington.

30 The first fully documented breeding pack in the state was confirmed in 2008. As of July 2011, there  
31 were five confirmed packs in Washington: two in Pend Oreille County; one in Stevens/Pend Oreille  
32 counties; one in Kittitas County; and one in Okanogan/Chelan counties. Only one of these, in Pend  
33 Oreille County, was a successful breeding pair in 2010. There were also indications of single  
34 additional packs in the Blue Mountains and North Cascades National Park; and at least a few solitary  
35 wolves are also likely to occur in other scattered locations of Washington. Human-related mortality,  
36 particularly illegal killing and legal control actions to resolve conflicts, is the largest source of  
37 mortality for the species in the northwestern United States and illegal killing has already been  
38 documented in Washington. In response to the return of wolves to Washington, there was a need  
39 for a state recovery plan per WAC 232-12-297, and in anticipation of the eventual return of all wolf

management to the state, the WDFW initiated development of a state wolf conservation and management plan under the State Environmental Policy Act (SEPA) in 2007. The plan will serve as the state recovery plan for the species. Washington's procedures for listing and delisting endangered, threatened and sensitive species are found in WAC 232-12-297. The procedures include requirements to set target recovery objectives for downlisting and delisting, and to identify management and recovery strategies to protect and restore listed species. The wolf conservation and management plan is the outline for state management and is designed to restore and protect a self-sustaining wolf population in Washington.

### 2.5.3. Plan Goals

The goals of the wolf conservation and management plan are to:

1. Restore the wolf population in Washington to a self-sustaining size and geographic distribution that will result in wolves having a high probability of persisting in the state through the foreseeable future (>50-100 years).
2. Manage wolf-livestock conflicts in a way that minimizes livestock losses, while not hindering the recovery or long-term perpetuation of a sustainable wolf population.
3. Maintain healthy and robust ungulate populations in the state that provide abundant prey for wolves and other predators as well as ample harvest opportunities for hunters.
4. Provide public outreach and promote public understanding of the conservation and management needs of wolves in Washington, thereby promoting the public's coexistence with the species.

## 2.6. Alternatives

Alternative strategies are one of the required components of an EIS, including a no-action alternative. They present meaningful options for WDFW to consider in managing gray wolves in Washington. Table 1 summarizes the four alternatives that were considered in the Draft EIS (WDFW 2009) and the revised Preferred Alternative 2. The four alternatives incorporate information gathered and issues raised through the SEPA scoping process, the public comments received on the Draft EIS, Wolf Working Group discussions and recommendations, and the results of scientific peer review. These alternatives present choices consistent with the purpose and need of the plan as described in Section 2.5.

## 2.7. Affected Environment, Significant Impacts, and Mitigation Measures

The wolf conservation and management plan consists of a set of strategies that strive to balance WDFW's mandate to conserve and recover endangered gray wolf populations, while addressing wolf-livestock, wolf-ungulate, and wolf-human conflicts. The potential environmental impacts that

1 might result from the approval and implementation of this non-project action are evaluated in  
2 Chapter 4, which describes the existing environment that might be affected by the proposal and  
3 analyzes significant impacts of alternatives, including the revised Preferred Alternative 2.  
4

5 The Final EIS analyzes the environmental impacts of the four alternatives to assess their risk of  
6 possible significant adverse impacts to elements of the environment and to identify mitigation  
7 measures that would avoid or minimize related adverse environmental impacts. Although this is a  
8 non-project proposal, to the degree possible, the analysis of impacts in the Final EIS considers the  
9 current and anticipated factors that may affect gray wolf recovery and other elements of the natural  
10 and built environment that could result from implementation of proposed management strategies in  
11 each alternative. Specific actions that may be proposed in the future relating to gray wolf  
12 management in Washington would be evaluated under a supplemental environmental impact  
13 statement process.  
14

15 Each of the four alternatives is evaluated for both positive and negative potential impacts to  
16 elements of the environment. The “elements of the environment” that were evaluated came from  
17 the list in WAC 197-11-444 (Appendix C). Those selected for evaluation were ones that had a  
18 possible impact related to implementation of the draft plan alternatives. The elements were  
19 associated with both the (1) natural environment and (2) built environment (WAC 197-11-444,  
20 elements of the environment).

### 3. Alternatives

This chapter describes and compares the four alternatives for the wolf conservation and management plan for Washington, including a “no action” alternative, that were included in the Draft EIS released on October 5, 2009. Table 1 provides a comparison of the alternatives presented in the Draft EIS, including the revised Preferred Alternative for the wolf conservation and management plan. It also includes alternatives considered, but not studied in detail because they did not meet the purpose and need of the plan.

This chapter describes the following:

- Alternatives considered but eliminated from detailed analysis
- Descriptions of alternatives considered in detail, with comparisons to the preferred alternative
- Selection of the preferred alternative

#### 3.1. Alternatives Considered, but Eliminated from Detailed Analysis

Under SEPA, a “reasonable alternative” is defined as “an action that could feasibly attain or approximate a proposal’s objectives, but at a lower environmental cost or decreased level of environmental degradation.” Reasonable alternatives may be those over which an agency with jurisdiction has authority to control impacts, either directly or indirectly (WAC 197-11-786). Suggestions for various alternatives were made to WDFW during the scoping, public review of the Draft EIS, and Wolf Working Group stakeholder discussions. The following alternatives were considered, but were excluded from detailed analysis because they did not meet the stated purpose and need of the plan and were not considered to be “reasonable.” These included:

- 1) Not setting any recovery objectives at this time.
- 2) Setting targets for delisting at fewer than 15 successful breeding pairs.
- 3) Restoring wolves to historical populations in the state.
- 4) Reducing the number of years to sustain recovery objectives to less than 3 years.
- 5) Reducing the geographic extent that wolves would need to occupy to achieve recovery objectives.
- 6) Reintroduction of wolves from outside the state.
- 7) Not allowing wolves to recover in Washington.

The alternative of not setting any recovery objectives at this time is similar to the “no action” Alternative 4 that is described in detail. Wolves would remain listed as endangered until a recovery plan was developed that established recovery objectives for downlisting and delisting. The option of not establishing conservation/recovery objectives until some wolf packs had established in the state

1 was initially discussed with the Wolf Working Group. Modeling of habitat use, demographics, and  
2 genetic considerations could then be used to derive scientifically-based estimates of the wolf  
3 numbers needed for recovery, which would then be placed in a future version of the plan. All  
4 Working Group members rejected this approach and recommended the inclusion of specific  
5 recovery objectives in the plan. It was determined that measureable objectives needed to be  
6 established to: meet state law (WAC 232-12-297); develop and implement management and  
7 conservation strategies that would recover a self-sustaining population in the state; and determine  
8 when downlisting and delisting could occur. The alternative of having no recovery objectives does  
9 not meet the purpose and need of the plan.

10  
11 Setting recovery objectives at fewer than 15 successful breeding pairs would not meet the goal of the  
12 wolf conservation and management plan to “restore the wolf population in Washington to a self-  
13 sustaining size and geographic distribution that will result in wolves having a high probability of  
14 persisting in the state through the foreseeable future (>50-100 years).” Based on scientific  
15 information about wolf population viability, scientific peer review of the recovery objectives  
16 proposed in the Draft EIS, the target of 15 successful breeding pairs for delisting t is considered  
17 minimal or barely adequate to achieve population viability and recovery; and some reviewers believe  
18 it to be too low to achieve viability and recovery.

19  
20 Restoring wolves to historical population levels was also excluded from consideration by WDFW at  
21 the beginning of the process because it is an attainable goal given the many changes to Washington’s  
22 landscape during the past 150 years.

23  
24 The three-year criteria and distribution requirements in three recovery regions are factors that  
25 contribute to the 15 breeding pairs being considered adequate to achieve recovery. For these  
26 reasons, proposals incorporating smaller numbers of successful breeding pairs, reduced geographic  
27 distribution, or shorter time requirements for the targets for downlisting and delisting wolves in  
28 Washington carry a high risk of not achieving the conservation purpose of the plan. Such proposals  
29 do not allow for robustness of the population on the landscape over time in light of fluctuations in  
30 numbers between years, genetic issues, and other considerations.

31  
32 Another alternative identified in the public scoping and considered, but not analyzed in detail, was  
33 the reintroduction of wolves into Washington from outside the state. One of the policy sideboards  
34 for the plan that was established by the WDFW director was that wolves would not be reintroduced  
35 into Washington from outside of the state to assist recovery. Instead, recovery would depend on  
36 wolves naturally dispersing back into the state on their own. It was determined that reintroduction  
37 would be an expensive, highly controversial, and unnecessary step because wolves were already  
38 dispersing into the state on their own and would continue to do so.

39  
40 Lastly, the alternative of “no wolves”, or not allowing wolves to recover in Washington, was not  
41 deemed reasonable and was specifically identified by the WDFW director as one of the “sideboards”

at the beginning of the planning process. Having no wolves was not an option, and clearly did not meet the stated purpose and need of the plan.

### 3.2. Descriptions of Alternatives Considered in Detail, with Comparisons to the Preferred Alternative

The four alternatives developed in the Draft EIS represented a range of options for balancing the conservation and management of wolves in Washington (Table 1). Alternatives 1-3 were consistent with the purpose and need of the plan (Chapter 2, Section 2.5). Alternative 4, the “no action” alternative, was presented and analyzed because it is required for SEPA; however, it does not meet the purpose and need of the plan.

The recovery objectives of 6, 12, and 15 successful breeding pairs for downlisting and delisting were constant within all of the alternatives, except Alternative 4, where there would be no conservation/recovery objectives developed. These recovery objectives are considered minimal for recovery in Washington and to meet the purpose and need of the plan to achieve a viable population of wolves in the state that would persist over the long term. Alternatives 1-3 varied in how the numbers of successful breeding pairs were distributed among recovery regions for downlisting and delisting criteria. Alternatives 1 and 2 each had three recovery regions (Figure 1); whereas Alternative 3 had four recovery regions (Figure 2).

The four alternatives considered in developing the plan are described with respect to the primary elements of conservation and management strategies (Table 1). Human-caused mortality is the single most important factor influencing recovery of wolves. As such, conserving wolves in Washington and meeting the delisting criteria will necessitate social tolerance for wolves on both public and private lands. It is unusual to include lethal management strategies in a plan for recovery of a listed species. However, to build public tolerance for wolves, a range of proactive, non-lethal, and lethal management options, as well as compensation, were outlined in the four alternatives to address wolf-livestock conflicts. Programs to compensate livestock producers for wolf-caused losses of livestock assist wolf recovery efforts by shifting some of the economic burden associated with wolf restoration away from producers, thereby minimizing further erosion of social tolerance for the species by affected citizens. Lethal control of wolves may be necessary to resolve repeated wolf-livestock conflicts and would be performed to remove problem animals that jeopardize public tolerance for overall wolf recovery. Implementation of management options that include lethal control would be based on the status of wolves to ensure that conservation/recovery objectives are met; and the four alternatives vary on when these management options become available.

#### 3.2.1. Brief Summary of Alternatives

**Alternative 1:** This alternative has a lower standard for protection and restoration of wolves in the state and a more aggressive lethal control strategy (Table 1). It implements lethal control options at

1 earlier phases of recovery than the other alternatives. It sets a lower standard for geographic  
2 distribution of recovery objectives, such that state downlisting and delisting of the species could  
3 occur with the majority of animals present in one or two recovery regions. It allows earlier  
4 implementation of management tools for addressing livestock conflicts, and it also offers a less  
5 generous compensation package for documented incidents of depredation.

6 **Alternative 2 (Preferred Alternative; Wolf Conservation and Management Plan):** This  
7 alternative meets the goals and objectives for establishing a long-term viable wolf population while  
8 addressing wolf-livestock conflicts and interactions between wolves and ungulates. It sets a  
9 moderate geographic distribution of recovery objectives for downlisting and delisting, with an  
10 emphasis on adequate numbers being present in the Southern Cascades/Northwest Coast recovery  
11 region, but does not require the establishment of wolves in a fourth Pacific Coast recovery region to  
12 achieve delisting. This alternative includes a range of proactive, non-lethal and lethal control options  
13 for addressing livestock conflicts, and generous compensation for confirmed and probable  
14 depredations on livestock.

15 This alternative was modified following public review of the Draft EIS, based on comments  
16 received from the public, peer review (Appendices E, F), and WDFW review. These modifications  
17 are reflected in the revised Preferred Alternative 2 and Final Recommended Wolf Conservation and  
18 Management Plan for Washington.

19 **Alternative 3:** This alternative places the greatest emphasis on protection and restoration of wolves  
20 in Washington. It has a higher standard for the geographic distribution of recovery objectives for  
21 downlisting and delisting wolves, including a requirement that they be present in a fourth recovery  
22 region, the Pacific Coast Recovery Region (Figure 2), before the species could be downlisted and  
23 delisted. This alternative is the most conservative on when management tools for addressing  
24 livestock conflicts could be implemented, and also includes the most generous compensation  
25 package for documented cases of confirmed and probable depredation.

26 **Alternative 4 – No Action (Current Management):** Under this alternative, no wolf conservation  
27 and management plan would be prepared for Washington. Protection and restoration of wolves  
28 would use existing programs. As a result, there would be no state recovery plan for the species and  
29 wolves would continue to be listed as endangered until a recovery plan was completed, with  
30 recovery objectives, and the species achieves the recovery objectives. Limited management options  
31 would be available for addressing conflicts. It is unknown whether compensation would be available  
32 for livestock losses, which would depend on whether any state or private fund sources existed for  
33 that purpose.

1

Table 1. Four alternatives for a wolf conservation and management plan for Washington. Alternative 2, the Preferred Alternative, was revised in the Final EIS/Plan following public, scientific peer, Wolf Working Group, and WDFW review of the October 2009 Draft EIS/Plan.					
Element	Alternative 1	Alternative 2 Draft Preferred October 2009	Revised Alternative 2 Final Preferred July 28, 2011	Alternative 3	Alternative 4 No Action – Current Management
Number of recovery regions	1. Eastern Washington 2. Northern Cascades 3. Southern Cascades/ Northwest Coast	1. Eastern Washington 2. Northern Cascades 3. Southern Cascades/ Northwest Coast	Same as October 2009 Draft Preferred Alternative 2	1. Eastern Washington 2. Northern Cascades 3. Southern Cascades 4. Pacific Coast	None designated
Number and distribution of successful breeding pairs in each recovery region to downlist and delist					
Downlist to Threatened  (6 successful breeding pairs)	2 in Eastern Washington 2 in Northern Cascades 2 anywhere in state	2 in Eastern Washington 2 in Northern Cascades 2 in Southern Cascades/ Northwest Coast	Same as October 2009 Draft Preferred Alternative 2	2 in Eastern Washington 2 in Northern Cascades 2 in Southern Cascades or Pacific Coast	No recovery objectives established. Wolves would remain listed as Endangered.
Downlist to Sensitive  (12 successful breeding pairs)	2 in Eastern Washington 2 in Northern Cascades 2 in Southern Cascades/ Northwest Coast 6 anywhere in state	2 in Eastern Washington 2 in Northern Cascades 5 in Southern Cascades/ Northwest Coast 3 anywhere in state	4 in Eastern Washington 3 in Northern Cascades 5 in Southern Cascades/ Northwest Coast	3 in Eastern Washington 3 in Northern Cascades 3 in Southern Cascades 3 in Pacific Coast	No recovery objectives established. Wolves would remain listed as Endangered.
Delist  (15 successful breeding pairs)	2 in Eastern Washington 2 in Northern Cascades 2 in Southern Cascades/ Northwest Coast 9 anywhere in state	2 in Eastern Washington 2 in Northern Cascades 5 in Southern Cascades/ Northwest Coast 6 anywhere in state	5 in Eastern Washington 4 in Northern Cascades 6 in Southern Cascades/ Northwest Coast	3 in Eastern Washington 3 in Northern Cascades 3 in Southern Cascades 3 in Pacific Coast 3 anywhere in state	No recovery objectives established. Wolves would remain listed as Endangered.
Translocation of wolves from one area of Washington to another to establish a new population	Available as a tool	Available as a tool	Same as October 2009 Draft Preferred Alternative 2	Available as a tool	Available as a tool
Manage for landscape connectivity	Continue existing efforts to maintain and restore habitat connectivity for wolves and other large- ranging carnivores.	Expand existing efforts to maintain and restore habitat connectivity for wolves.	Same as October 2009 Draft Preferred Alternative 2	Expand existing efforts to maintain and restore habitat connectivity for wolves.	Continue existing efforts to maintain and restore habitat connectivity for wolves and other large- ranging carnivores.

Table 1. Four alternatives for a wolf conservation and management plan for Washington. Alternative 2, the Preferred Alternative, was revised in the Final EIS/Plan following public, scientific peer, Wolf Working Group, and WDFW review of the October 2009 Draft EIS/Plan.					
Element	Alternative 1	Alternative 2 Draft Preferred October 2009	<i>Revised</i> Alternative 2 Final Preferred July 28, 2011	Alternative 3	Alternative 4 No Action – Current Management
Use of non-lethal injurious harassment	Allowed with a permit and training from WDFW during all listed statuses; will be reconsidered during Endangered status if used inappropriately or a mortality occurs under this provision.	Allowed with a permit and training from WDFW during all listed statuses; will be reconsidered during Endangered status if used inappropriately or a mortality occurs under this provision.	Same as October 2009 Draft Preferred Alternative 2	Allowed with a permit and training from WDFW upon reaching Sensitive status; will be reconsidered if used inappropriately or a mortality occurs under this provision.	Possibly allowed, consistent with state and federal law.
Lethal control by state/federal agents of wolves involved in repeated livestock depredations	Allowed, consistent with state and federal law.	Allowed, consistent with state and federal law.	Allowed, consistent with state and federal law.  WDFW may consider issuing a permit to a livestock owner to conduct lethal control on private land they own or lease if WDFW does not have the resources to address control.	Allowed, consistent with state and federal law.	Allowed, consistent with state and federal law.
Lethal control by livestock owners (including family members and authorized employees) of wolves involved in repeated livestock depredations	Allowed with an issued permit on private lands and public grazing allotments they own or lease when wolves reach Threatened status.	Allowed with an issued permit on private lands and public grazing allotments they own or lease when wolves reach Sensitive status.	Same as October 2009 Draft Preferred Alternative 2	Allowed with an issued permit on private lands they own or lease when wolves reach Sensitive status.	Per consistency and allowances of federal and state law.

Table 1. Four alternatives for a wolf conservation and management plan for Washington. Alternative 2, the Preferred Alternative, was revised in the Final EIS/Plan following public, scientific peer, Wolf Working Group, and WDFW review of the October 2009 Draft EIS/Plan.					
Element	Alternative 1	Alternative 2 Draft Preferred October 2009	<i>Revised</i> Alternative 2 Final Preferred July 28, 2011	Alternative 3	Alternative 4 No Action – Current Management
Lethal take of wolves in the act of attacking (biting, wounding, or killing) livestock	Allowed by livestock owners (including family members and authorized employees) on private land they own or lease during all listed statuses. Would be reconsidered if used inappropriately or more than 2 mortalities occur under this provision in a year.	Allowed by livestock owners (including family members and authorized employees) on private land they own or lease when wolves reach Threatened status. Would be reconsidered if used inappropriately or more than 2 mortalities occur under this provision in a year.	Allowed by livestock owners, (including family members and authorized employees) on private land they own or lease at all listed statuses, with an issued permit, after documented depredation (injury or killing) in the area and efforts to resolve the problem have been deemed ineffective.  Would trigger a review by WDFW if used inappropriately or if 2 mortalities occur under this provision in a year. WDFW would evaluate the circumstances of the mortalities and determine if it would continue issuing permits.	Allowed by livestock owners (including family members and authorized employees) on private land they own or lease when wolves reach Sensitive status. Would be reconsidered if used inappropriately or more than 2 mortalities occur under this provision in a year.	Per consistency and allowances of federal and state law.

Table 1. Four alternatives for a wolf conservation and management plan for Washington. Alternative 2, the Preferred Alternative, was revised in the Final EIS/Plan following public, scientific peer, Wolf Working Group, and WDFW review of the October 2009 Draft EIS/Plan.					
Element	Alternative 1	Alternative 2 Draft Preferred October 2009	<i>Revised</i> Alternative 2 Final Preferred July 28, 2011	Alternative 3	Alternative 4 No Action – Current Management
Lethal take of wolves in the act of attacking (biting, wounding, or killing) pet dogs	Allowed by private citizens on private lands when wolves reach Threatened status, and on private and public land when wolves are delisted. Would be reconsidered if used inappropriately or more than 2 mortalities occur under this provision in a year.	Allowed by private citizens on private lands when wolves reach Sensitive status, and on private and public land when wolves are delisted. Would be reconsidered if used inappropriately or more than 2 mortalities occur under this provision in a year.	Not allowed.	Allowed by private citizens on private and public land when wolves are delisted.	Per consistency and allowances of federal and state law.
Payment for confirmed livestock depredation	Full value for each confirmed depredation on all parcel sizes.  Losses covered on private lands only.	Twice the full value for each confirmed depredation on grazing sites of 100 or more acres.  Full value for each confirmed depredation on sites of less than 100 acres.  Losses covered on both private and public lands.	On grazing sites of 100 or more acres, and where the agency determines that it would be difficult to survey the entire acreage, full current market value for two animals for each confirmed depredation.  It would not include double payment if all other animals are accounted for.  On sites of less than 100 acres, full current market value for each confirmed depredation. Losses covered on both private and public lands.	Twice the full value for each confirmed depredation on all parcel sizes.  Losses covered on both private and public lands.	Unknown. Depending on availability of funds, compensation for losses may be possible from state or private sources. Amounts and types of livestock covered could vary depending on restrictions of fund sources.

Table 1. Four alternatives for a wolf conservation and management plan for Washington. Alternative 2, the Preferred Alternative, was revised in the Final EIS/Plan following public, scientific peer, Wolf Working Group, and WDFW review of the October 2009 Draft EIS/Plan.

Element	Alternative 1	Alternative 2 Draft Preferred October 2009	<i>Revised</i> Alternative 2 Final Preferred July 28, 2011	Alternative 3	Alternative 4 No Action – Current Management
Payment for probable livestock depredation	<p>Half the full value for each probable depredation on all parcel sizes.</p> <p>Losses covered on private lands only.</p>	<p>Full value for each probable depredation on grazing sites of 100 or more acres.</p> <p>Half the value for each probable depredation on sites of less than 100 acres.</p> <p>Losses covered on private and public lands.</p>	<p>On grazing sites of 100 or more acres, and where the agency determines that it would be difficult to survey the entire acreage, half the current market value for two animals for each confirmed depredation.</p> <p>It would not include double payment if all other animals are accounted for.</p> <p>On sites of less than 100 acres, half the current market value for each confirmed depredation. Losses covered on both private and public lands.</p>	<p>Full value for each probable depredation on grazing sites of all sizes.</p> <p>Losses covered on private and public lands.</p>	<p>Unknown. Depending on availability of funds, compensation for losses may be possible from state or private sources. Amounts and types of livestock covered could vary depending on restrictions of fund sources.</p>

Table 1. Four alternatives for a wolf conservation and management plan for Washington. Alternative 2, the Preferred Alternative, was revised in the Final EIS/Plan following public, scientific peer, Wolf Working Group, and WDFW review of the October 2009 Draft EIS/Plan.					
Element	Alternative 1	Alternative 2 Draft Preferred October 2009	<i>Revised</i> Alternative 2 Final Preferred July 28, 2011	Alternative 3	Alternative 4 No Action – Current Management
Proactive measures to reduce depredation	WDFW would work with livestock operators to provide technical assistance to implement proactive measures to reduce conflicts.  Assistance with some costs may be paid by Defenders of Wildlife on a limited basis.	WDFW would hire wolf specialists, whose duties would include working with livestock operators to provide technical assistance to implement proactive measures to reduce conflicts.  Assistance with some costs may be paid by Defenders of Wildlife on a limited basis.	WDFW will provide technical assistance to livestock operators to implement proactive measures to reduce conflicts.  Assistance with some costs may be paid by non-profit organizations or other entities on a limited basis	WDFW would hire wolf specialists, whose duties would include working with livestock operators to provide technical assistance to implement proactive measures to reduce conflicts.  Assistance with some costs may be paid by Defenders of Wildlife on a limited basis.	Unknown. Currently, some costs of proactive measures may be paid by private sources, and some limited state funding may be available to help defray costs, or to provide technical assistance.
Ungulate management	Manage for healthy ungulate populations through habitat improvement, harvest management, and reduction of illegal hunting using existing WDFW game management plans.	Manage for healthy ungulate populations through habitat improvement, harvest management, and reduction of illegal hunting. Manage harvest to benefit wolves only in localized areas if research has determined wolves are not meeting recovery objectives and prey availability is a limiting factor.	Manage for healthy ungulate populations through habitat improvement, harvest management, and reduction of illegal hunting, consistent with game management plans.	Manage for healthy ungulate populations through habitat improvement, harvest management, and reduction of illegal hunting. Manage harvest of ungulates to benefit wolves in each recovery region until recovery objectives for the region are met.	Manage for healthy ungulate populations through habitat improvement, harvest management, and reduction of illegal hunting using existing WDFW game management plans.

Table 1. Four alternatives for a wolf conservation and management plan for Washington. Alternative 2, the Preferred Alternative, was revised in the Final EIS/Plan following public, scientific peer, Wolf Working Group, and WDFW review of the October 2009 Draft EIS/Plan.					
Element	Alternative 1	Alternative 2 Draft Preferred October 2009	<i>Revised</i> Alternative 2 Final Preferred July 28, 2011	Alternative 3	Alternative 4 No Action – Current Management
Wolf-ungulate conflict management	After wolves reach Sensitive status, if research determines that wolf predation is a limiting factor for ungulate populations that are below herd objectives, could consider moving, lethal control and other control techniques in localized areas.	After wolves are delisted, if research determines that wolf predation is a limiting factor for at-risk ungulate populations, could consider moving of wolves, lethal control, or other control techniques in localized areas.	<p>If the Department determines that wolf predation is a primary limiting factor for at-risk ungulate populations and the wolf population in that recovery region is healthy, it could consider moving of wolves, lethal control, or other control techniques in localized areas.</p> <p>The status of wolves statewide as well as within a specific wolf recovery region where ungulate impacts are occurring would be considered in decision-making relative to wolf control. Decisions will be based on scientific principles and evaluated by WDFW.</p>	After wolves are delisted, if research determines that wolf predation is a limiting factor for at-risk ungulate populations, could consider moving of wolves, or other non-lethal control techniques in localized areas.	Wolves would remain listed. Measures to address conflicts of this type would be contingent on consistency with state and federal law.
Outreach and education	Use existing WDFW staff to continue outreach and education at current levels.	Use WDFW wolf specialists to conduct outreach and education programs.	Use WDFW staff to conduct outreach and education programs.	Use WDFW wolf specialists and staff to conduct outreach and education programs. Would be a high priority activity.	Use existing WDFW staff to conduct outreach and education at current levels.

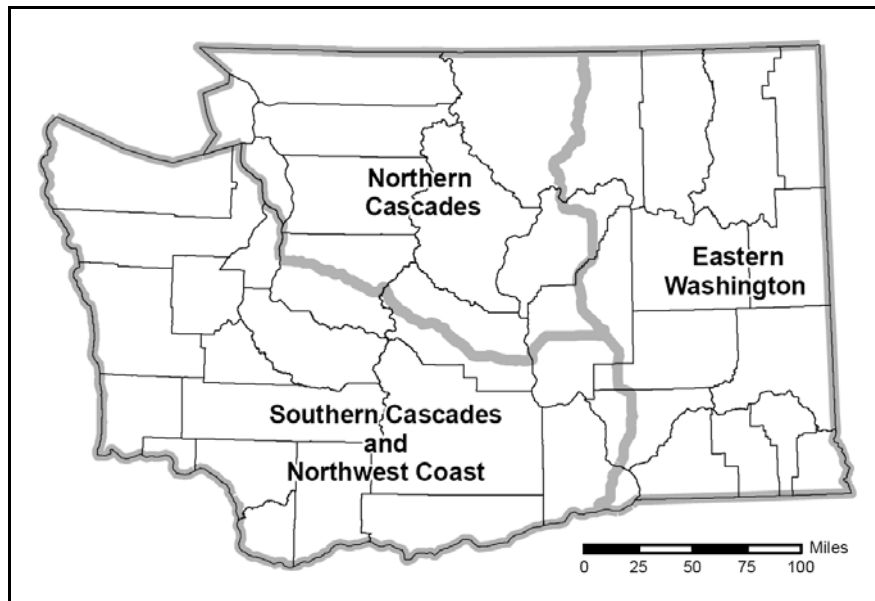


Figure 1. Three gray wolf recovery regions proposed for Washington in Alternatives 1, 2.

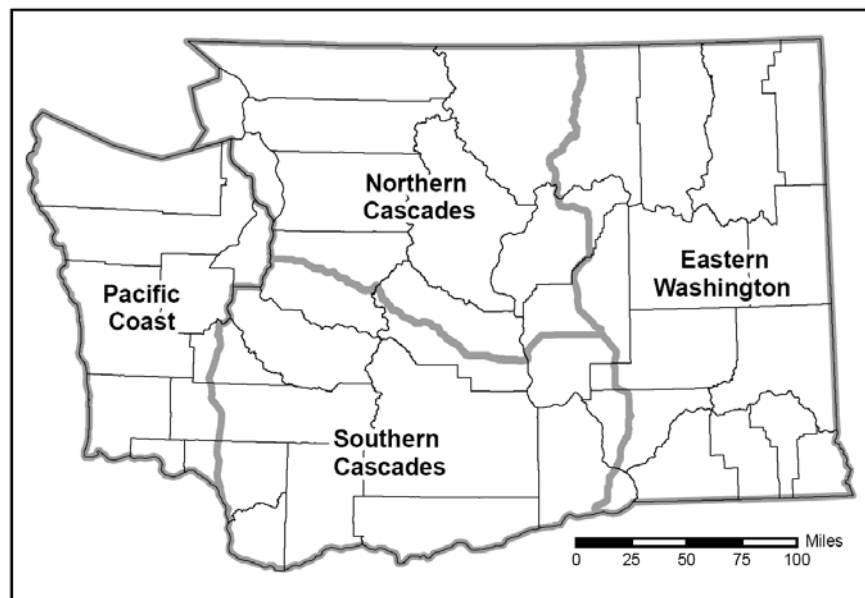


Figure 2. Four gray wolf recovery regions proposed for Washington in Alternative 3.

### 3.2.2. Revised Preferred Alternative 2 (Final Recommended Wolf Conservation and Management Plan)

The revised Preferred Alternative 2 is the WDFW Final Recommended Wolf Conservation and Management Plan for Washington. Changes made to the Preferred Alternative 2 from the Draft EIS to the Final EIS reflect input from the public (Appendix F), 3 anonymous scientific peer reviewers (Appendix E), comments from the Wolf Working Group, and WDFW review. The elements of the preferred alternative are intended to meet the scientific standard to accomplish recovery and long-term persistence of wolves in Washington, and to provide methods and strategies to address livestock conflicts and ungulate interactions. The recommended plan requires a recovered population (15 successful breeding pairs for 3 years) distributed in three recovery regions, but does not require establishment of a wolf population in a fourth recovery region (the Pacific Coast, Figure 2) to achieve delisting.

The plan sets moderate conservation objectives while addressing conflicts with livestock through implementation of non-lethal proactive methods, use of lethal control, and generous compensation for wolf depredation. It provides for managing healthy ungulate populations through habitat improvement, harvest management, and reduction of illegal hunting, consistent with game management plans. The plan also addresses wolf-ungulate conflict management for at-risk ungulate populations if certain conditions are met. If WDFW determines that wolf predation is a primary limiting factor for an at-risk ungulate population and the wolf population in that recovery region is healthy (exceeding recovery objectives for that region), it could consider moving of wolves, lethal control, or other control techniques in localized areas prior to statewide delisting, as long as management actions did not push the wolf population below delisting objectives. The plan includes translocation (moving animals from one area of Washington to another to establish a new population) as a tool that could be used to establish a wolf population in a recovery region that wolves have not colonized through natural dispersal. This would require an extensive separate environmental impact analysis if proposed in the future. Other elements of the plan include maintaining and restoring landscape connectivity; outreach and education efforts; and research. The objectives and strategies to achieve delisting in the plan are to:

1. Develop and implement a program to monitor the population status, trends, and conservation and management needs of wolves in Washington.
2. Protect wolves from sources of mortality and disturbance at den sites.
3. Translocate wolves, if needed, to help achieve recovery objectives.
4. Develop and implement a comprehensive program to manage wolf-livestock conflicts in cooperation with livestock producers.
5. Maintain healthy and robust ungulate populations in the state that provide abundant prey for wolves and other predators as well as ample harvest opportunities for hunters.

6. Manage wolf-human interactions to reduce human safety concerns, prevent habituation of wild wolves, decrease the risk of conflicts between domestic dogs and wolves, and to build awareness of the risks posed by wolf hybrids and pet wolves.
7. Maintain and restore habitat connectivity for wolves in Washington.
8. Manage conflicts between wolves and state and federal listed/candidate species.
9. Develop and implement a comprehensive outreach and education program.
10. Coordinate and cooperate with public agencies, landowners, tribes, and non-governmental organizations to help achieve wolf conservation and management objectives.
11. Conduct research on wolf biology, conservation, and management in Washington.
12. Report on and evaluate implementation of the plan.

Key elements of the Final Preferred Alternative 2 are described below, including specific changes from the Draft Preferred Alternative (Table 1):

**Number of Recovery Regions:** Alternative 2 establishes 3 recovery regions in the state: Eastern Washington, Northern Cascades, and a combined Southern Cascades/Northwest Coast (Figure 1, Table 1). This element did not change in the Final EIS. Although there was strong public support (Appendix F) for four recovery regions (Alternative 3), with separate recovery objectives for a Pacific Coast Recovery region (Figure 1), this alternative was not selected. WDFW believes it is possible to recover wolf populations in the three recovery regions established in Alternative 2. Any wolves that become established in the Pacific Coast area would be counted toward the recovery objectives for the Southern Cascades/Northwest Coast recovery region in the Preferred Alternative; but wolf establishment in the Pacific Coast area would not be required in order to achieve the delisting objective.

One of the criteria for removing a species from state listed status in Washington is that it must occupy a significant portion of its original geographic range. A “significant portion of the species’ historical range” is defined under WAC 232-12-297, section 2.9, as that portion of a species’ range likely to be essential to the long-term survival of the population in Washington. Although wolves historically occurred throughout Washington, they do not need to reoccupy all of their former range to meet the recovery objectives of this plan. The northern and southern Cascade Mountains comprise much of the “significant portion of the historical range” that would ensure the long-term survival of the population.

Despite the presence of considerable high quality habitat for wolves on the Olympic Peninsula and in southwestern Washington, wolves would not need to occupy these areas to achieve recovery. Wolf occupancy in the northern Cascades, southern Cascades and eastern Washington recovery areas would meet the recovery objectives for each of the three recovery regions. Eastern

1 Washington is currently being recolonized from adjacent populations in neighboring states and  
2 British Columbia, whereas the Olympic Peninsula and southwestern Washington are distant from  
3 colonizing sources and separated by additional impediments or barriers to natural dispersal (e.g.  
4 Interstate 5, developed areas of the Puget Sound lowlands). Recovery is therefore likely to happen  
5 more quickly through the reoccupation of eastern Washington and the Cascade mountains than  
6 waiting for wolves to reach the far western regions of Washington.

7  
8 **Numbers and Distribution Requirements for Downlisting and Delisting:** The Final EIS  
9 Preferred Alternative 2 maintained the number of successful breeding pairs of wolves required for  
10 statewide downlisting and delisting as in the Draft EIS: from endangered to threatened (6 breeding  
11 pairs), sensitive (12 breeding pairs), and delisting (15 breeding pairs).

12 WDFW received a significant number of public and peer review comments regarding the inadequacy  
13 of the Draft EIS recovery objectives (15 breeding pairs). In the blind peer review process, two of  
14 the three reviewers stated that the recovery objectives in the draft WDFW wolf plan were  
15 inadequate. One further stated that they were not based on sound science, but rather on a  
16 compromise of science and public acceptance. Both reviewers believed that the number of  
17 successful breeding pairs needed to achieve delisting should be higher and that the plan fell below  
18 current scientific standards for sustainability and genetic viability. Both recommended that WDFW  
19 conduct a population viability analysis to determine appropriate recovery criteria for wolves in  
20 Washington.

21 Because the number 15 was selected as acceptable by most members of the wolf working group,  
22 WDFW decided it would first evaluate whether the establishment of 15 breeding pairs was an  
23 adequate goal for delisting criteria. If not, WDFW would determine if higher numbers of breeding  
24 pairs may be necessary for achieving recovery. Results of the analysis suggested that with an initial  
25 population of 15 breeding pairs (i.e., an estimated range of 97-365 wolves), the population could  
26 persist for 50 years, and did not fall below recovery objectives, as long as it was allowed to grow and  
27 was not limited. Other associated factors that reduced the risk to viability included robustness on  
28 the landscape (3 years), using successful breeding pairs as the measure, and distribution throughout  
29 three recovery regions in a significant portion of the species' historical range. If the population  
30 model assumptions are correct, WDFW believes that meeting these criteria would likely result in a  
31 self-sustaining wolf population. If the demographic characteristics of the established wolf  
32 population differ from those of the population model (as stated in the wolf plan), WDFW would  
33 reevaluate the delisting criteria to determine if they were sufficient.

34 The regional distribution of recovery objectives for downlisting to threatened status stayed the same  
35 as in the Draft EIS, but the regional distribution for downlisting from threatened to sensitive and  
36 for delisting changed (Table 1). The regional distribution of recovery objectives for downlisting and  
37 delisting are as follows:

- 1       • To reclassify from state endangered to state threatened status: 6 successful breeding pairs  
2       present for 3 consecutive years, with 2 successful breeding pairs in each of the three recovery  
3       regions.
- 4
- 5       • To reclassify from state threatened to state sensitive status: 12 successful breeding pairs  
6       present for 3 consecutive years, with 4 successful breeding pairs in the Eastern Washington  
7       recovery region, 3 in the Northern Cascades recovery region, and 5 in the Southern Cascades  
8       and Northwest Coast recovery region.
- 9
- 10      • To delist from state sensitive status: 15 successful breeding pairs present for 3 consecutive  
11      years, with 5 successful breeding pairs in the Eastern Washington recovery region, 4 in the  
12      Northern Cascades recovery region, and 6 in the Southern Cascades and Northwest Coast  
13      recovery region.
- 14

15 Previously unassigned breeding pairs (“that could occur anywhere in the state”) in the Draft EIS  
16 were assigned to specific recovery regions in the Final EIS for sensitive and delisting statuses (Table  
17 1). Two of three unassigned pairs in the downlisting objective for threatened to sensitive were  
18 assigned to the Eastern Washington region and one was assigned to the Northern Cascades region.  
19 Of the six unassigned breeding pairs in the delisting objective, 3 were assigned to Eastern  
20 Washington, 2 to the Northern Cascades, and one to the Southern Cascades and Northwest Coast.  
21 The revised allocation of breeding pairs strengthens regional recovery objectives by bringing them  
22 more in line with statewide availability of suitable wolf habitat and prey and reflecting the natural  
23 colonization of wolves from source populations in adjacent states and provinces.

24 Greater numbers of breeding pairs in the Southern Cascades/Northwest Coast region reflects the  
25 greater availability of suitable wolf habitat and prey in this region. Greater numbers of breeding  
26 pairs in the Eastern Washington region reflects the importance of this region in its proximity to  
27 source populations of wolves in adjacent states. It is also anticipated that at least one breeding pair  
28 will eventually establish in the Blue Mountains, which is likely to be isolated from other wolves that  
29 become established in the northern part of the Eastern Washington recovery region. As a result, it  
30 would have a low likelihood of contributing to the viability of the Eastern Washington population.

31 All breeding pairs were assigned to a recovery region to eliminate uncertainty regarding when  
32 objectives would be met within a particular recovery region, to be consistent with other recovery  
33 plan objectives for listed species, and to be able to monitor breeding success from year to year.  
34 Allocating previously unassigned breeding pairs was also necessary to conduct population modeling  
35 and to consider management within a recovery region before statewide delisting was achieved.  
36 Monitoring to determine consecutive years of successful breeding could also be difficult unless  
37 breeding pair numbers were assigned to specific recovery regions. The number of successful pair  
38 counts could shift among regions from year to year, which would lead to an inability to determine  
39 when recovery had been reached.

40 Having unassigned breeding pairs also does not allow management approaches to differ within one  
41 region prior to achieving delisting goals statewide (e.g. wolf-ungulate interactions) because it would

1 never be known when recovery objectives were achieved within a region until all 15 breeding pairs  
2 were established for three consecutive years among all three recovery regions. For these reasons,  
3 WDFW designated the unassigned pairs to specific recovery regions in the Final EIS Preferred  
4 Alternative.

5 **Translocation:** No changes were made to this provision in the revised Preferred Alternative 2  
6 (Table 1). Translocation, which is defined as moving animals from one recovery area of Washington  
7 to another to establish a new population, is available as a tool if wolves fail to reach one or more  
8 recovery regions through natural dispersal. Potential benefits from translocation are that 1) it could  
9 speed the process of establishing wolves in unoccupied recovery regions, thereby leading to greater  
10 management flexibility in addressing conflicts, 2) it could be used to reduce wolf numbers in  
11 recovery regions where the species has already exceeded recovery objectives, and 3) by speeding  
12 recovery, it could help lower the overall costs associated with recovery. It would, however, require a  
13 separate environmental analysis process if it were proposed to be used.

14 **Manage for landscape connectivity:** No changes were made to this provision in the revised  
15 Preferred Alternative 2 (Table 1). Washington's objective of 15 successful breeding pairs distributed  
16 across three recovery regions and maintained for 3 consecutive years is believed to be sufficient to  
17 result in the reestablishment of self-sustaining wolf population in the state as long as connectivity is  
18 maintained with populations in Idaho, Montana, British Columbia, and Oregon. Within  
19 Washington, safe passage within and between habitat areas is vital for allowing wolves to disperse  
20 and recolonize unoccupied habitat and for promoting genetic and demographic exchange between  
21 subpopulations. On a regional scale, maintaining cross-border habitat linkages between Washington  
22 and Idaho, British Columbia, and Oregon is vital to the reestablishment and long-term viability of a  
23 wolf population in Washington. This alternative would expand existing efforts to maintain and  
24 restore habitat connectivity for wolves.

25 **Use of non-lethal injurious harassment:** No changes were made to this provision in the revised  
26 Preferred Alternative 2 (Table 1). Non-lethal forms of harassment can make wolves more fearful of  
27 people and livestock, making it less likely that they would frequent areas occupied by people and  
28 livestock. Non-lethal injurious harassment involves striking wolves with rubber bullets or other  
29 non-lethal projectiles. Under this alternative, livestock owners and grazing allotment holders (or  
30 their designated agents) may be issued a permit to use this form of harassment on their own land or  
31 their legally designated allotment, respectively, regardless of wolf listing status. This would require  
32 authorization from WDFW and training in the use of the above listed projectiles. While wolves are  
33 state listed as endangered, the use of non-lethal injurious harassment would be reconsidered if used  
34 inappropriately or if a mortality occurred under this provision.

35 **Lethal control by state/federal agents of wolves involved in repeated livestock depredations:**  
36 In Alternative 2, lethal control of wolves would be conducted by WDFW or federal agents and  
37 would be available regardless of wolf listing status, consistent with federal law. A minor revision to  
38 this element in the revised Preferred Alternative 2 (Table 1) is that WDFW may consider issuing a

1 permit to a livestock owner to conduct lethal control on private land they own or lease if WDFW  
2 does not have the resources to address control.

3 Lethal removal may be used to stop repeated depredation if it is documented that livestock have  
4 clearly been killed by wolves, non-lethal methods have been tried but failed to resolve the conflict,  
5 depredations are likely to continue, and there is no evidence of intentional feeding or unnatural  
6 attraction of wolves by the livestock owner. Situations would have to be evaluated on a case-specific  
7 basis, with management decisions based on pack history and size, pattern of depredations, number  
8 of livestock killed, state listed status of wolves, extent of proactive management measures being used  
9 on the property, and other considerations. If it is determined that lethal removal is necessary, it  
10 would likely be used incrementally, as has been done in other states, with one or two offending  
11 animals removed initially. If depredations continue, additional animals may be removed.

12 **Lethal control by livestock owners of wolves involved in repeated livestock depredations:**

13 Under this alternative, WDFW may permit livestock owners (including their family members and  
14 authorized employees) to lethally control a limited number of wolves during a specific time period  
15 on private lands and public grazing allotments they own or lease after wolves reach state sensitive  
16 status. No changes were made to this provision in the revised Preferred Alternative 2 (Table 1).

17 **Lethal take of wolves in the act of attacking (biting, wounding, or killing) livestock:** This  
18 provision was modified in the revised Preferred Alternative 2 to include: 1) the issuing of a permit  
19 by WDFW, 2) changes to the listing statuses at which this provision is allowed, and 3) the  
20 requirement that documented depredation in the area must have already occurred and efforts to  
21 resolve the problem were tried but deemed ineffective (Table 1).

22 Under Alternative 2 in the Draft EIS, livestock owners, family members, and authorized employees  
23 would have been allowed to lethally take wolves “in the act” of attacking livestock (defined as biting,  
24 wounding, or killing; not chasing or pursuing) on private land they own or lease, after wolves reach  
25 state threatened status. In the revised Preferred Alternative 2, this provision is allowed by livestock  
26 owners (including family members and authorized employees) on private land they own or lease  
27 regardless of wolf listing status, with an issued permit, after documented depredation (injury or  
28 killing) in the area and efforts to resolve the problem have been deemed ineffective.

29 Efforts to resolve the problem may either be preventative measures (i.e., documented non-lethal  
30 actions implemented specifically to minimize or avoid wolf-livestock conflict before the initial  
31 depredation), or non-lethal control efforts (i.e., non-lethal actions implemented specifically to  
32 minimize or avoid wolf-livestock conflict after the initial depredation). The permit holder is  
33 required to continue implementing non-lethal actions to minimize or avoid wolf-livestock conflicts  
34 during the life of the permit, with issuance of future permits being contingent upon this effort. “In  
35 the area” means the area known to be used by the depredating wolves. In some cases, the area may  
36 be specifically delineated by data (i.e., radio telemetry). Permits for this activity may be issued for  
37 protection of all types of livestock covered under this plan and to both commercial and non-  
38 commercial livestock operators.

WDFW will provide training to permit holders to ensure the appropriate use of this provision. Wolves stalking, looking at, or passing near livestock, present in a field with livestock, or present on private property are not considered to be in the act of attacking. Wolves may not be intentionally baited, fed, or deliberately attracted for any purpose, including killing under this provision. Wolves killed under this provision must be reported to WDFW within 24 hours, with additional reasonable time allowed if there is limited access to the kill site. The wolf carcass must be surrendered to WDFW and preservation of physical evidence from the scene of the attack on livestock for inspection by WDFW is required.

Review of this management tool by WDFW would be triggered if it were used inappropriately or if two wolves were killed under it in a year. A review of this type would evaluate the circumstances of the mortalities or other problems, and would result in a determination of whether WDFW should stop issuing new permits or withdraw existing permits.

**Lethal take of wolves in the act of attacking (biting, wounding, or killing) pet dogs:** Under Alternative 2 in the Draft EIS, private citizens would have been allowed to kill a wolf that is “in the act” of attacking (defined as biting, wounding, or killing; not chasing or pursuing) domestic dogs on private land after wolves were downlisted to state sensitive status and on private or public land after they were delisted. During sensitive status, this provision would have reconsidered if used inappropriately or more than 2 mortalities occur in a year.

Under the revised Preferred Alternative 2, this provision has been eliminated (Table 1). It will remain illegal to kill a wolf in the act of attacking a pet dog while state-listed. Attacks on dogs are usually related to defense of pups at dens or rendezvous sites or defense of territories rather than acts of predation. As wolves expand their range in Washington, dog owners will need to be aware of the potential risks to their animals if they are within wolf pack territories. Some wolves will occupy areas near human habitation and areas used recreationally (e.g., national forests), which could put hunting or pet dogs at risk of depredation, especially if they are running at large. Outreach and education will be necessary to inform homeowners and hikers with dogs who visit sites where wolves may occur about preventative measures that can be taken to avoid wolf-dog encounters.

**Compensation payment for confirmed and probable livestock depredation:** The only change to this provision in the revised Preferred Alternative 2 (Table 1) was clarification of wording to explain payments for livestock losses on different sized grazing sites, and the addition of some caveats for when higher payments would be made.

This alternative provides for a two-tiered compensation system for confirmed and probable wolf-killed livestock on private and public lands. Under Alternative 2 in the Draft EIS, higher compensation payments would have been paid on grazing sites of 100 or more acres because it is harder to find livestock carcasses on larger acreages. For each documented loss on sites of this size, a two-to-one ratio for payment would have been used to account for a possible carcass that couldn't be located. Payments for claims on smaller areas did not include compensation for unknown

1 animals because livestock owners are typically able to supervise their stock more closely and can find  
2 nearly all carcasses.

3 Under the revised Preferred Alternative 2, for each animal confirmed as a wolf kill on grazing sites  
4 of 100 or more acres, and where the agency determines it would be difficult to survey the entire  
5 acreage or that not all animals are accounted for, owners would receive the full current market value  
6 for two animals. For each animal documented as a probable wolf kill, owners would receive half the  
7 current market value for two animals. On grazing sites not meeting the above criteria, owners  
8 would receive the full current market value of each animal confirmed as a wolf kill and half the  
9 current market value of each animal documented as a probable wolf kill. Current market value is the  
10 value of an animal at the time it would have normally gone to market. The wolf conservation and  
11 management plan defines livestock as cattle, calves, pigs, horses, mules, sheep, lambs, llamas, goats,  
12 guarding animals, and herding dogs. This differs from a state statutory definition of livestock under  
13 RCW 77.36, which is limited to horses, cows and sheep. Payment of compensation will be  
14 contingent on availability of funding and, where applicable, the restrictions of state or private  
15 funding sources.

16 **Proactive measures to reduce depredation:** Implementation of proactive non-lethal measures  
17 such as modified husbandry techniques and non-lethal deterrents, can reduce (1) livestock  
18 depredations by wolves, (2) the need to conduct lethal control, and (3) the costs of compensation  
19 programs. Thus, use of such measures can build social tolerance for wolves and aid conservation of  
20 the species. However, implementation of these measures can result in higher costs for livestock  
21 producers.

22 In the revised Preferred Alternative 2, changes were made on the hiring of additional personnel to  
23 provide technical assistance to livestock operators and modifications to potential sources of non-  
24 profit funding for proactive measures to reduce depredation (Table 1). In the Draft EIS Preferred  
25 Alternative 2, WDFW would hire wolf specialists whose duties would have included working with  
26 livestock producers to provide technical assistance on non-lethal management methods and  
27 technologies to minimize wolf-livestock conflicts and depredations. Instead, in the revised Preferred  
28 Alternative 2, WDFW staff will provide technical assistance to livestock operators to implement  
29 proactive measures to reduce conflicts. WDFW could seek funding for assistance with  
30 implementing proactive measures and would work with other organizations and agencies that are  
31 interested in providing livestock producers with funding, additional training, and other resources  
32 needed to implement this type of assistance.

33 **Ungulate management:** The modification to this provision in the revised Preferred Alternative 2  
34 was the removal of the sentence regarding “managing ungulate harvest to benefit wolves if research  
35 determines wolves are below recovery objectives and prey is limiting” (Table 1). The Draft EIS  
36 Alternative 2 directed managing for healthy ungulate populations through habitat improvement,  
37 harvest management, and reduction of illegal hunting to improve abundance in areas occupied or  
38 likely to be occupied by wolves. It also included a provision that if research determined that wolves

were not meeting recovery objectives in localized areas and prey availability was a key limiting factor, WDFW would have considered adjusting recreational harvest levels to provide adequate prey for wolves. This provision was removed in the revised Preferred Alternative 2.

Maintaining robust prey populations will benefit wolf conservation in Washington by providing adequate prey for wolves, supplying hunters and recreational viewers of wildlife with continued opportunities for hunting and seeing game, and reducing the potential for livestock depredation by providing an alternative food to domestic animals. In the revised Preferred Alternative 2, WDFW would manage for healthy ungulate populations through habitat improvement, harvest management, and reduction of illegal hunting, consistent with game management plans.

**Wolf-ungulate conflict management:** This provision was changed in the Final EIS in the following ways: 1) wolf-ungulate conflict management could occur at all listed statuses, rather than only after delisting, 2) wolf-ungulate conflict management could occur within a recovery region after taking into consideration the status of wolves statewide and within the specific wolf recovery region (the regional wolf population is healthy) where ungulate impacts were occurring, 3) the term “at-risk ungulate population” was redefined, 4) the determination and importance of wolf predation as a limiting factor was changed from “*if research determines that wolf predation is a limiting factor...*” to “*if the Department determines that wolf predation is a primary limiting factor...*” for at-risk ungulate populations, and 5) decisions would be based on scientific principles and evaluated by WDFW (Table 1).

Wolves are expected to inhabit areas of Washington with abundant prey that already support multiple species of predators and recreational hunters. The effect on ungulate populations from adding wolves to existing predation levels and hunter harvest is difficult to predict for Washington, but information from Idaho, Montana, and Wyoming, each of which currently supports about 340-700 wolves, suggests that wolves will have little or no effect on elk and deer abundance or hunter harvest across large areas of Washington. Nevertheless, wolves have been linked to declining elk herds in some areas, although wolves were often just one of several contributing factors affecting the herds (e.g., changes in habitat, severe winter weather, and increasing populations of other predators).

In the Draft EIS Alternative 2, after wolves were delisted, WDFW could have considered moving wolves, or using lethal control or other control techniques to reduce wolf abundance in localized areas with an at-risk ungulate population if research had determined that wolf predation was a key limiting factor for the ungulate population. In the revised Final EIS Preferred Alternative 2, this element was changed to: If the Department determines that wolf predation is a primary limiting factor for at-risk ungulate populations and the wolf population in that recovery region is healthy (exceeding delisting objectives within the region), it could consider moving of wolves, lethal control, or other control techniques in localized areas. The status of wolves statewide as well as within a specific wolf recovery region where ungulate impacts were occurring would be considered in decision-making. Decisions will be based on scientific principles and evaluated by WDFW.

The definition of an “at-risk” ungulate population in the Draft EIS Alternative 2 was:

1 “any federal or state listed ungulate population (population (e.g., Selkirk Mountain woodland  
2 caribou, Columbian white-tailed deer). It may also include a game species’ population that has  
3 experienced a dramatic decline from historical levels and has stayed at low levels for a  
4 significant period of time.”

5 This was changed in the revised Preferred Alternative 2 to:

6 “any federal or state listed ungulate population (e.g., Selkirk Mountain woodland caribou,  
7 Columbian white-tailed deer), or any ungulate population for which it is determined to have  
8 declined 25% or more below management objectives for three or more years and population  
9 trend analysis predicts a continued decline. For populations for which numeric estimates  
10 and/or management objectives are not currently available, it will not be possible to use a  
11 specific threshold to assess a need for management action. Instead WDFW will use other  
12 sources of information related to the population, such as harvest trends, hunter effort trends,  
13 sex and age ratios, and others.”

14 **Outreach and education:** Outreach and education efforts are essential to wolf conservation. It is  
15 crucial that wolves and wolf management issues be portrayed in an objective and unbiased manner,  
16 and that the public receives accurate information about the species. One change was made to this  
17 provision in the revised Preferred Alternative 2 of the Final EIS (Table 1). In the Draft EIS,  
18 WDFW would have used wolf specialists to conduct outreach and education programs. In the Final  
19 EIS, this was changed to WDFW staff would conduct outreach and education programs.

### 20 21 **3.2.3. Alternative 1**

22 Alternative 1 has a lower standard for protection and restoration of wolves in the state and a more  
23 aggressive lethal control strategy. The alternative sets the lowest objectives for achieving geographic  
24 distribution, has a reduced emphasis on reestablishing wolves in the Southern Cascades/Northwest  
25 Coast Recovery Region, and does not require the establishment of a wolf population in a fourth  
26 recovery region (the Pacific Coast) to achieve recovery. This alternative would allow lethal control  
27 of wolves by livestock owners to occur sooner than that allowed in Alternative 2 (Preferred  
28 Alternative), but offers lower levels of compensation payments for wolf-caused depredation of  
29 livestock. It proposes managing ungulate prey populations through standard practices, does not  
30 recommend adjusting recreational harvest levels to benefit wolf conservation in certain limited  
31 situations, and proposes that removal of wolves could be considered for management of ungulate  
32 populations that were below herd objectives (not limited to at-risk ungulate populations) under  
33 certain limited circumstances after wolves reach sensitive status. This alternative allows  
34 translocation of wolves within the state if needed, but allows for limited efforts to protect landscape  
35 connectivity and to conduct public outreach and education regarding wolves.

36 Key elements of Alternative 1 are:

**Number of Recovery Regions:** This alternative has the same 3 recovery regions as in Alternative 2 (Preferred Alternative) (Table 1).

**Distribution Requirements for Downlisting and Delisting:** For Alternative 1, the conservation/recovery objectives for downlisting and delisting are:

- From endangered to threatened: 6 successful breeding pairs are present for 3 consecutive years, with at least 2 successful breeding pairs in both the Eastern Washington and Northern Cascades recovery regions and 2 other successful breeding pairs in any of the three recovery regions.
- From threatened to sensitive: 12 successful breeding pairs are present for 3 consecutive years, with at least 2 successful breeding pairs each in the Eastern Washington, Northern Cascades, and Southern Cascades/Northwest Coast recovery regions, and 6 successful breeding pairs that can be distributed in any of the three recovery regions.
- Delisting: 15 successful breeding pairs for 3 consecutive years, with at least 2 successful breeding pairs each in the Eastern Washington, Northern Cascades, and Southern Cascades/Northwest Coast recovery regions, and 9 successful breeding pairs that can be distributed in any of the three recovery regions.

**Translocation:** Translocation is available as a tool under Alternative 1.

**Manage for landscape connectivity:** Maintaining connectivity with wolf populations in Idaho, Montana, British Columbia, and Oregon is needed to ensure the establishment of a self-sustaining recovered wolf population in Washington. Under Alternative 1, WDFW would continue to work with other agencies and organizations to maintain and restore habitat connectivity for wolves and other wide-ranging carnivores, but less emphasis would be placed on these efforts than under the revised Preferred Alternative 2.

**Use of non-lethal injurious harassment:** Use of this tool by livestock owners and grazing allotment holders (or their designated agents) and oversight by WDFW would be the same under Alternative 1 and the revised Preferred Alternative 2, with use allowed regardless of wolf listing status. While wolves are listed as endangered, this would be reconsidered if harassment was used inappropriately or a mortality occurred under this provision.

**Lethal control by state/federal agents of wolves involved in repeated livestock depredations:** Use of this tool by state/federal agents is allowed regardless of wolf listing status, consistent with federal and state law.

**Lethal control by livestock owners of wolves involved in repeated livestock depredations:** Use of this measure would be allowed by livestock owners (including family members and authorized employees) with a permit from WDFW after wolves reach state threatened status under Alternative 1, rather than state sensitive status as called for in the revised Preferred Alternative 2.

1 **Lethal take of wolves in the act of attacking (biting, wounding, or killing) livestock:** Under  
2 Alternative 1, use of this provision would be allowed by livestock owners (including family members  
3 and authorized employees) on private land they own or lease regardless of the wolf listing status.  
4 While wolves are state listed as endangered, this management tool will be reconsidered if used  
5 inappropriately or if more than two wolves are killed under this provision in a year. The revised  
6 Preferred Alternative 2 allows this action to be taken after a permit has been issued and only after  
7 depredation has been documented in the area and efforts to resolve the problem have been deemed  
8 ineffective.

9 **Lethal take of wolves in the act of attacking (biting, wounding, or killing) domestic dogs:**  
10 Under Alternative 1, use of this provision would be allowed by private citizens on private land after  
11 wolves are downlisted to state threatened status. While wolves are state listed, this provision will be  
12 reconsidered if used inappropriately or more than 2 mortalities occur in a year. This contrasts with  
13 the revised Preferred Alternative 2, which does not allow this measure.

14 **Compensation payment for confirmed and probable livestock depredation:** Alternative 1  
15 provides a less generous compensation package without consideration of size of grazing site for  
16 confirmed and probable wolf-killed livestock on private and public lands than that provided in the  
17 revised Preferred Alternative 2. Under Alternative 1, livestock producers would receive the full  
18 current market value for each confirmed livestock depredation and half the current market value for  
19 each probable livestock depredation.

20 **Proactive measures to reduce depredation:** Under Alternative 1, WDFW would use existing staff  
21 (with limited time availability) to provide livestock producers with technical assistance on non-lethal  
22 management methods and technologies to minimize wolf-livestock conflicts and depredations. This  
23 is the same as the revised Preferred Alternative 2. Under both alternatives, WDFW could seek  
24 funding for assistance with implementing proactive measures and would work with other  
25 organizations and agencies that are interested in providing livestock producers with funding,  
26 additional training, and other resources needed to implement this type of assistance.

27 **Ungulate management:** Alternative 1 and the revised Preferred Alternative 2 both recommend  
28 managing for healthy ungulate populations through habitat improvement, harvest management, and  
29 reduction of illegal hunting to improve abundance in areas occupied or likely to be occupied by  
30 wolves, through implementation of existing game management plans

31 **Wolf-ungulate conflict management:** Under Alternative 1, after wolves reach sensitive status,  
32 WDFW could consider reducing wolf abundance in localized areas where ungulate populations were  
33 below herd objectives by moving wolves, or using lethal control or other control techniques if  
34 research determines that wolf predation is a limiting factor for ungulate populations that are below  
35 herd objectives. In the revised Preferred Alternative 2, if the Department determines that wolf  
36 predation is a primary limiting factor for at-risk ungulate populations and the wolf population in that  
37 recovery region is healthy (exceeding delisting objectives within the region), it could consider  
38 moving of wolves, lethal control, or other control techniques in localized areas. The status of

1 wolves statewide as well as within a specific wolf recovery region where ungulate impacts were  
2 occurring would be considered in decision-making. Decisions will be based on scientific principles  
3 and evaluated by WDFW.

4 **Outreach and education:** Under Alternative 1, as in the revised Preferred Alternative 2, WDFW  
5 would use existing staff to develop and conduct public outreach and education programs. In  
6 Alternative 1, program efforts would remain the same as currently provided by WDFW. Under the  
7 revised Preferred Alternative 2, outreach and education efforts would be expanded.

#### 8 **3.2.4. Alternative 3**

9 Alternative 3 is predicted to have a higher probability of achieving and maintaining a long-term  
10 viable wolf population in Washington compared to the other alternatives. It has the most stringent  
11 distribution requirements, and places increased emphasis on reestablishing wolves in far western  
12 Washington by requiring a wolf population to be present on the Olympic Peninsula or in the Willapa  
13 Hills to achieve recovery. This alternative would place somewhat greater limitations on the use of  
14 lethal control of wolves by livestock owners than the revised Preferred Alternative 2, but would  
15 offer higher levels of compensation payments for wolf-caused depredation of livestock. It provides  
16 for continued management of ungulate prey populations through standard practices, but would also  
17 adjust levels of recreational harvest to benefit wolf conservation in each wolf recovery region until  
18 recovery objectives for the region were met. It acknowledges that management of at-risk ungulate  
19 populations may require removal of wolves after delisting under certain limited circumstances, but  
20 limits wolf removals to non-lethal methods. This alternative allows translocating wolves within the  
21 state if needed, expanding efforts to maintain and restore landscape connectivity, and making wolf  
22 conservation outreach and education a high priority.

23 Key elements of Alternative 3 are:

24 **Number of Recovery Regions:** This alternative would create a fourth recovery region known as  
25 the Pacific Coast Recovery Region (Figure 2). It would retain the Eastern Washington and  
26 Northern Cascades recovery regions, but would separate the Southern Cascades/Northwest Coast  
27 region into two separate recovery regions (Southern Cascades and Pacific Coast). In comparison,  
28 the revised Preferred Alternative 2 and Alternative 1 would have only 3 recovery regions: Eastern  
29 Washington, Northern Cascades, and the Southern Cascades/Northwest Coast.

30 **Distribution Requirements for Downlisting and Delisting:** For Alternative 3, the  
31 conservation/recovery objectives for downlisting and delisting are:

- 32 • From endangered to threatened: 6 successful breeding pairs are present for 3 consecutive  
33 years, with at least 2 successful breeding pairs in both the Eastern Washington and Northern  
34 Cascades Recovery Regions, and at least 2 successful breeding pairs distributed in either the  
35 Southern Cascades or Pacific Coast Recovery Regions, or one in each of these two regions.

- From threatened to sensitive: 12 successful breeding pairs are present for 3 consecutive years, with at least 3 successful breeding pairs in each of the four recovery regions.

- Delisting: 15 successful breeding pairs for 3 consecutive years, with at least 3 successful breeding pairs each of the four recovery regions, and 3 successful breeding pairs that could be distributed in any of the four recovery regions.

**Translocation:** Translocation goals and implementation would be the same under Alternative 3 and the revised Preferred Alternative 2.

**Manage for landscape connectivity:** Maintaining connectivity with wolf populations in Idaho, Montana, British Columbia, and Oregon is needed to ensure the establishment of a self-sustaining wolf population in Washington. Under Alternative 3, the need to expand existing efforts to maintain and restore habitat connectivity for wolves would be emphasized the same as in the revised Preferred Alternative 2.

**Use of non-lethal injurious harassment:** In Alternative 3, use of this tool by livestock owners and grazing allotment holders (or their designated agents) and oversight by WDFW would be delayed until wolves were downlisted to state sensitive status. In contrast, the revised Preferred Alternative 2 allows it to be used in all listed phases, with a permit and training.

**Lethal control by state/federal agents of wolves involved in repeated livestock depredations:** Use of this tool by state/federal agents would be the same under Alternative 3 and the revised Preferred Alternative 2, with use allowed during all state listed statuses, consistent with state and federal law.

**Lethal control by livestock owners of wolves involved in repeated livestock depredations:** Use of this measure would be allowed by livestock owners (including family members and authorized employees) with a permit from WDFW after wolves reach state sensitive status under both Alternative 3 and the revised Preferred Alternative 2. However, while wolves are state-listed as Sensitive, Alternative 3 would restrict the use of lethal control to private lands that the livestock owner or family members/authorized employees own or lease; the revised Preferred Alternative 2 allows use of lethal control on both private and public lands that a livestock owner (including family members and authorized employees) owns or leases after wolves are downlisted to state sensitive status.

**Lethal take of wolves in the act of attacking (biting, wounding, or killing) livestock:** Under Alternative 3, use of this provision would be allowed by livestock owners (including family members and authorized employees) on private land they own or lease after wolves were downlisted to state sensitive status. While wolves are state listed as sensitive, this management tool would be reconsidered if used inappropriately or if more than two wolves were killed under this provision in a year. This contrasts with the revised Preferred Alternative 2, which allows this with an issued

1 permit, after documented depredation in the area and efforts to resolve the problem have been  
2 deemed ineffective.

3 **Lethal take of wolves in the act of attacking (biting, wounding, or killing) domestic dogs:**

4 Neither Alternative 3 or the revised Preferred Alternative 2 allows use of this provision while wolves  
5 are listed.

6 **Compensation payment for confirmed and probable livestock depredation:** Among the four  
7 alternatives, Alternative 3 has the most generous compensation package for confirmed and probable  
8 wolf depredations of livestock. Under this alternative, a livestock owner would receive payment at  
9 twice the value for each confirmed depredation on grazing areas of all sizes. For each probable  
10 depredation, the owner would receive the full value of the animal. In contrast to the revised  
11 Preferred Alternative 2, which uses a two-tiered payment system with higher payments offered for  
12 losses on grazing areas of 100 or more acres, Alternative 3 would not take size of the grazing area  
13 into consideration when determining compensation amounts. Both Alternative 3 and the revised  
14 Preferred Alternative 2 recommend compensation for losses occurring on both private and public  
15 lands.

16 **Proactive measures to reduce depredation:** The goals and implementation of proactive measures  
17 would be the same under Alternative 3 and the revised Preferred Alternative 2.

18 **Ungulate management:** Alternative 3 and the revised Preferred Alternative 2 both recommend  
19 managing for healthy ungulate populations through habitat improvement, harvest management, and  
20 reduction of illegal hunting to improve abundance in areas occupied or likely to be occupied by  
21 wolves. However, under Alternative 3, consideration would be given to adjusting recreational  
22 harvest levels to benefit wolves in each recovery region until recovery objectives for the region were  
23 met. By comparison, the revised Preferred Alternative 2 does not address adjusting harvest levels to  
24 benefit wolves in localized areas if research determined that wolves were not meeting recovery  
25 objectives and prey availability was an important limiting factor.

26 **Wolf-ungulate conflict management:** Under Alternative 3, WDFW could consider moving  
27 wolves or using other non-lethal control measures to reduce wolf abundance in localized areas with  
28 at-risk ungulate populations after wolves were delisted and research had demonstrated that wolf  
29 predation was a key limiting factor for the ungulate population. This differs from the revised  
30 Preferred Alternative 2 by restricting control measures to non-lethal techniques only.

31  
32 **Outreach and education:** Under Alternative 3, WDFW would use wolf specialists and existing  
33 staff to conduct develop and conduct outreach and education programs for wolves. These efforts  
34 would be a higher priority than under the revised Preferred Alternative 2 and would rely on both  
35 WDFW wolf specialists and other staff (as available).

**3.2.5. Alternative 4: No Action (Current Management)**

Analysis of a No Action (Current Management or Status Quo) Alternative (Alternative 4) is required by SEPA. This alternative would maintain WDFW's current management approach toward wolves and would not result in the development of a wolf conservation and management plan. The lack of a recovery plan means that there would be no conservation objectives established for downlisting and delisting the species in Washington. Thus, wolves would remain a state endangered species into the foreseeable future until such a plan was developed with objectives for downlisting and delisting, and the species achieved recovery objectives. Under this alternative, wolf conservation and management activities by WDFW would continue as currently performed. Livestock owners would be able to implement proactive non-lethal approaches for resolving conflicts with wolves, and state or federal agents would perform lethal removals of wolves, if consistent with federal and state law.

Without a state plan, it is unknown what state or private funding programs might be available to compensate for wolf depredation of livestock. Under Alternative 4, WDFW would continue to manage ungulate prey populations through standard practices, but would not adjust recreational harvest levels to benefit wolf conservation, or manage ungulate populations through removal of wolves. Translocation of wolves could occur within the state, if needed, but without recovery objectives, there would be a lack of incentive or justification. Efforts to protect landscape connectivity and conduct outreach and education about wolf conservation and management would continue at current levels as provided by existing WDFW staff. Because Alternative 4 would not result in the eventual state delisting of wolves in Washington, it does not meet the stated purpose and need of a wolf conservation and management plan.

Key elements of Alternative 4 are:

**Number of Recovery Regions:** There would be no recovery regions designated under this alternative.

**Distribution Requirements for Downlisting and Delisting:** There would be no conservation/recovery objectives designated for achieving state downlisting and delisting of wolves in Washington under this alternative. Wolves would remain listed as endangered until a state recovery plan was developed, with objectives for downlisting and delisting established.

**Translocation:** Translocation would be available as a tool; however, without recovery regions established or recovery objectives, there would be no incentive or justification for translocation.

**Manage for landscape connectivity:** Under this alternative, WDFW would continue existing efforts to work with other agencies and organizations to maintain and restore habitat connectivity for wolves and other wide-ranging carnivores. However, these efforts would be less expansive than under the revised Preferred Alternative 2.

1 **Use of non-lethal injurious harassment:** Under Alternative 4, use of this tool by livestock owners  
2 and grazing allotment holders (or their designated agents) would possibly be allowed, with a permit  
3 and training, consistent with state and federal law.

4 **Lethal control by state/federal agents of wolves involved in repeated livestock depredations:**  
5 Use of this measure by state/federal agents would be the same under Alternative 4 and the revised  
6 Preferred Alternative 2, with use allowed, consistent with state and federal law.

7 **Lethal control by livestock owners of wolves involved in repeated livestock depredations:**  
8 Under Alternative 4, this tool would be subject to the conditions and limitations of state law. In the  
9 revised Preferred Alternative 2, this measure would be available on both private land and public  
10 grazing allotments after wolves reached state Sensitive status.

11 **Lethal take of wolves in the act of attacking (biting, wounding, or killing) livestock:** Under  
12 this alternative, this measure would be subject to the conditions and limitations of state and federal  
13 law. By comparison, the revised Preferred Alternative 2 allows this measure regardless of wolf  
14 listing status, with an issued permit, after documented depredation in the area and efforts to resolve  
15 the problem have been deemed ineffective.

16 **Lethal take of wolves in the act of attacking (biting, wounding, or killing) domestic dogs:**  
17 Under Alternative 4, this provision would be subject to the conditions and limitations of state and  
18 federal law. Under the revised Preferred Alternative 2, this measure is not allowed.

19 **Compensation payment for confirmed and probable livestock depredation:** In contrast to the  
20 revised Preferred Alternative 2, which pays compensation at a 2:1 ratio on grazing sites greater than  
21 or equal to 100 acres, and at a 1:1 ratio on smaller acreages, compensation in Alternative 4 would be  
22 limited to that currently paid by any existing state or private programs to compensate livestock  
23 operators for losses.

24 **Proactive measures to reduce depredation:** Under Alternative 4, reimbursement for  
25 implementing proactive measures to reduce wolf depredation of livestock would be limited to that  
26 paid by any existing private or state programs. By comparison, under the revised Preferred  
27 Alternative 2, WDFW would actively work with livestock producers to provide technical assistance  
28 on non-lethal management methods and technologies to minimize wolf-livestock conflicts and  
29 depredations. WDFW could seek funding for assistance with implementing proactive measures and  
30 would work with other organizations and agencies that are interested in providing livestock  
31 producers with funding, additional training, and other resources needed to implement this type of  
32 assistance.

33 **Ungulate management:** Alternative 4 and the revised Preferred Alternative 2 both recommend  
34 managing for healthy ungulate populations through habitat improvement, harvest management, and  
35 reduction of illegal hunting to improve abundance in areas occupied or likely to be occupied by  
36 wolves, through implementation of existing game management plans

1 **Wolf-ungulate conflict management:** Under Alternative 4, measures to resolve conflicts between  
2 wolves and ungulate populations would be delayed until wolves were delisted. Wolves would remain  
3 listed until a state recovery plan was developed and outlined recovery goals (downlisting and  
4 delisting) were met.

5 **Outreach and education:** Under Alternative 4, WDFW would use existing staff to develop and  
6 conduct outreach and education programs about wolf conservation and management. Program  
7 efforts would remain the same as currently expended at WDFW.  
8

### 9 **3.3. Selection of the Preferred Alternative**

10  
11 Alternative 3 places the greatest emphasis on protection and restoration of wolves in Washington,  
12 but has less emphasis on management options for addressing wolf-livestock conflicts. Alternative 1  
13 has the least emphasis on protection and restoration of wolves in the state and wolf populations  
14 could continue to be at risk under this alternative because of more aggressive lethal control and a  
15 more limited geographic distribution in the state. Alternative 4 emphasizes protection and  
16 restoration of wolves using existing programs, but does not develop a conservation and  
17 management plan. As a result, wolves would continue to be listed as endangered and the purpose  
18 and need of a plan would not be met. The Revised Alternative 2 is the Final Preferred Alternative  
19 because it more fully addresses and balances the purpose and need of the plan, as described in  
20 Chapter 1, Purpose and Need. It best meets the goals and objectives for establishing a long-term  
21 viable wolf population in Washington while at the same time addressing wolf-livestock conflicts and  
22 interactions between wolves and wild ungulates.

## 4. Affected Environment and Environmental Consequences

WAC 197-11-444 (Appendix C) provides a comprehensive list of subjects that must be considered in this analysis with the caveat that the EIS must only study the elements that apply to this proposal. The alternatives described in detail in Chapter 2 of the Draft EIS for the Wolf Conservation and Management Plan (WDFW 2009) have been examined in the context of WAC 197-11-144. The following elements are evaluated with respect to consideration of possible environmental effects of implementing conservation and management strategies in the revised Preferred Alternative 2:

### (1) Natural Environment (Plants and Animals)

- a. Habitat for and numbers or diversity of species of plants, fish, or other wildlife (wolves, other carnivores, ungulates, ecosystem effects)
- b. Unique species (listed species, candidate species, and species of concern)

### (2) Built Environment (Land and Shorelines Use)

- a. Recreation (hunting, wildlife watching, other types of backcountry recreation)
- b. Agricultural crops (livestock)
- c. Land use

## 4.1. Natural Environment – Plants and Animals

There are several elements of the natural environment that might be expected to experience direct and indirect impacts resulting from implementation of conservation and management strategies in the revised Preferred Alternative 2. They include: wolves, other carnivores, ungulates, ecosystems, and other listed wildlife species. Impacts of the various alternatives to wolves are primarily direct, whereas impacts to most of the other elements of the natural environment are indirect. Both types of impacts can be anticipated as wolves recolonize and re-establish populations in Washington based on documented impacts in other western states where wolf recovery has occurred. Recovery level, geographic distribution of a recovered wolf population, and management actions to resolve conflicts under the different alternatives may determine the possible impacts to these elements of the environment. Predicting indirect environmental impacts of the revised Preferred Alternative 2 is speculative because the conservation and management plan alternatives are non-project proposals, which lack very specific actions. The likely adverse or beneficial impacts to the natural environment of the revised Preferred Alternative 2 are discussed below.

### 4.1.1. Wolves

Gray wolves were formerly common throughout most of Washington, but they declined rapidly between 1850 and 1900. The primary cause of this decline was the killing of wolves by Euro-American settlers as ranching and farming activities expanded. Wolves were essentially eliminated as

1 a breeding species from the state by the 1930s, although infrequent reports of animals continued in  
2 the following decades, suggesting that small numbers of individuals continued to disperse into  
3 Washington from neighboring states and British Columbia.

4  
5 Reliable reports of wolves have been increasing in Washington since 2005. The first fully  
6 documented breeding pack was confirmed in 2008. As of July 2011, there were five confirmed  
7 packs in the state: two in Pend Oreille County; one in Pend Oreille/Stevens counties; one in Kittitas  
8 County; and one in Okanogan/Chelan counties. Only one of these, in Pend Oreille County, met the  
9 definition of a successful breeding pair in 2010. There were also indications of an additional pack in  
10 the Blue Mountains and another pack in North Cascades National Park; and at least a few solitary  
11 wolves are likely to occur in other scattered locations of Washington.

12  
13 Wolves are highly social and live in packs typically averaging five to ten individuals. Packs normally  
14 produce a single litter annually that averages four to six pups. Diet consists mainly of ungulates,  
15 with elk, deer and moose expected to be the main prey in Washington. Some food is obtained  
16 through scavenging. Packs establish territories and defend them from trespassing wolves. Territory  
17 sizes usually average about 200 to 400 square miles in the western United States. From late April  
18 until September, pack activity is centered at or near den or rendezvous sites, as adults hunt and bring  
19 food back to the pups. One or more rendezvous sites are used after pups emerge from the den.  
20 Upon reaching sexual maturity, most wolves disperse from their natal pack to search for a mate and  
21 start a new pack of their own. Individuals may disperse to unoccupied habitat near their natal  
22 pack's territory or they travel much longer distances before locating vacant habitat, a mate, or  
23 another pack to join. Wolves are habitat generalists, but most populations in western North  
24 America occur predominantly in forests and nearby open habitats with adequate prey.  
25 Human-caused mortality is the largest source of wolf mortality in the western United States  
26 (Mitchell et al. 2008) and is the only factor that can significantly affect the recovery of populations.  
27 On average, an estimated 10% of the wolves in the northern Rocky Mountain states die annually  
28 from control actions, 10% from illegal killing, 3% from human-related accidents, and 3% from  
29 natural causes (USFWS 2009). Once established, wolf populations can withstand high mortality  
30 rates as long as that reproductive rates are also high and immigration continues. In most locations,  
31 sustainable mortality rates range from about 22-24% (Creel and Rotella 2010).

32 The Recommended Plan (revised Preferred Alternative 2) identifies strategies to reestablish a  
33 naturally reproducing and viable population of wolves distributed in a significant portion of the  
34 species' former range in Washington. Conservation/recovery objectives for downlisting and  
35 delisting are set at sufficient numbers of individuals and geographic extent to ensure that a viable  
36 population is reestablished. For the purposes of the Recommended Plan, a "viable" population is  
37 one that is able to sustain its size, distribution, and genetic variation for the long term (50-100 years)  
38 without requiring human intervention and conservation actions. Such populations must also be able  
39 to withstand fluctuations in abundance and recruitment associated with variation in food supplies,  
40 predation, disease, and habitat quality. For wolves, long-term persistence of a population in

Washington will depend on other factors as well, including proximity and connectivity to source populations (outside and potentially within the state), competing carnivore populations (e.g., bears, cougars, and coyotes), the extent of conflicts with livestock production, and overall social tolerance by people.

- **Alternative 1.** The downlisting and delisting objectives in Alternative 1 could result in a more limited geographic distribution of wolves in Washington. Alternative 1 has a lower recovery objective for reestablishing wolves in the Southern Cascades/Northwest Coast Recovery Region and does not require the establishment of a wolf population in a fourth recovery region (Pacific Coast) to achieve delisting. This could result in most wolves being concentrated in the Eastern Washington and Northern Cascades recovery regions upon delisting. Translocation could be used to expand distribution, but under this alternative, there would be limited efforts to protect landscape connectivity to promote movement and genetic exchange among populations.

This alternative would likely result in higher levels of human-caused mortality of wolves. Lethal control of wolves by livestock owners would be allowed to occur during Threatened status. Lethal and non-lethal control of wolves determined to be limiting ungulate populations would be allowed if those herds were below herd objectives when wolves were at Sensitive status. Non-lethal removal of wolves to protect these herds could be detrimental to wolf populations by disrupting pack dynamics, therefore reducing pack productivity. This alternative would not involve reductions in recreational harvest levels in certain limited situations to benefit wolf populations that were not achieving recovery objectives and were constrained by prey availability. This alternative would be less likely to increase public tolerance for wolves because both compensation for wolf-caused depredation of livestock and outreach and education efforts would be maintained at current levels.

Alternative 1 is predicted to have potentially adverse impacts on achieving the long-term persistence of a wolf population in Washington as it would likely result in higher mortality rates, slower population growth among wolves, and a more limited geographic distribution.

- **Revised Preferred Alternative 2 –** The recovery objectives in the revised Preferred Alternative 2 would require that wolves have a fairly extensive geographic distribution in Washington at the time of delisting. The requirement for at least five successful breeding pairs in the Southern Cascades/Northwest Coast Recovery Region for reaching sensitive status and six breeding pairs to meet the delisting objective achieves a stronger presence in this portion of the state. However, establishment of a wolf population in a Northwest Coast portion of the recovery region is not required to achieve recovery, thus this alternative does not seek to reestablish wolves statewide. Under this alternative, translocation would be available to expand distribution if needed and efforts would be continued or expanded to

maintain and restore landscape connectivity to promote movement and genetic exchange among populations.

The conservation and management strategies of this alternative would likely result in intermediate levels of human-caused mortality in wolves. These include allowing the use of lethal control of wolves by livestock owners with a permit (to be issued by WDFW under certain limited circumstances) and lethal control for addressing conflicts with at-risk ungulate populations; both would be allowed regardless of listing status. The generous livestock compensation system under this alternative and expansion of outreach and education would likely increase public tolerance for wolves, thereby helping to reduce human-caused mortalities. This alternative manages for healthy ungulate populations through implementation of game management plans (including habitat improvement, harvest management, and reduction of illegal hunting). This could benefit some wolf populations by retaining adequate prey availability.

The revised Preferred Alternative 2 sets intermediate goals for numbers and distribution of wolves in Washington by using recovery objectives that attempt to be both demographically sustainable and socially acceptable. The objectives are expected to result in establishment of a population that can demonstrate long-term persistence and is distributed across a significant portion of the state, while ensuring that livestock and some ungulate conflicts are addressed. The revised Preferred Alternative 2 is expected to result in recovery of a self-sustaining population because it will result in reduced mortality, can use translocation to speed recovery, and does not require wolves become established in a Pacific Coast region.

- **Alternative 3.** Alternative 3 is predicted to have the most beneficial impact for wolves and the highest probability of achieving and maintaining a self-sustaining wolf population in Washington. The management strategies in Alternative 3 would likely result in lower levels of human-caused mortality of wolves, which could allow larger numbers of wolves to be present in the state when delisting occurs. Alternative 3 would place more limitations on the use of lethal control of wolves by livestock owners and would not consider lethal control of wolves to enhance ungulate populations. Use of non-lethal removal of wolves to protect ungulate populations would be limited to herds considered “at-risk,” thus removals of this type would be unlikely to disrupt pack dynamics and productivity. This alternative would allow reductions in recreational harvest levels of ungulates in each recovery region until wolf recovery objectives for the region were met, thereby ensuring sufficient prey for expanding wolf populations. The most generous livestock compensation system and expanded outreach and education efforts under this alternative would be more likely to increase public tolerance for wolves than under other alternatives.

The recovery objectives in Alternative 3 would ensure the broadest geographic distribution of wolves in Washington at the time of delisting by requiring the establishment of a wolf population with at least three successful breeding pairs in the Pacific Coast recovery region.

Under this alternative, translocation could be used to expand distribution and there would be stronger efforts to protect landscape connectivity for wolves to promote movement and genetic exchange among populations.

Alternative 3 is highly likely to result in a wolf population with larger numbers and a broader distribution, and hence greater viability at the time of delisting. However, because of the requirement for wolves to be established in the Pacific Coast region, it would likely take longer to achieve recovery, unless translocation was used in recovery regions where wolves were not establishing breeding pairs on their own.

- **Alternative 4 – No Action (Current Management).** This alternative would continue wolf conservation and management activities as currently performed, without development of a wolf conservation and management plan, and with no recovery objectives established. Wolves would remain listed as endangered until a recovery plan was developed. As such, human-caused mortality would probably remain relatively low because of restrictions on lethal control by livestock owners and for the purpose of managing ungulate populations. Non-lethal removal of wolves to protect ungulates would not be expected. This alternative would continue current management for healthy ungulate populations through habitat improvement, harvest management, and reduction of illegal hunting using existing WDFW game management plans. It is unknown whether there would be adjustments to recreational harvest levels to benefit wolf populations that were determined to be prey-limited. This alternative would continue current programs for compensation for wolf-caused depredation of livestock and existing outreach and education efforts, thus it would be less likely to increase public tolerance for wolves.

Under the current management practices of Alternative 4, it is unknown how rapidly wolves might expand their geographic distribution to meet the requirement that it be a significant portion of their former range in Washington, but it would probably occur more slowly than if proactive recovery efforts were underway. Translocation of wolves would be possible under Alternative 4, but it is doubtful that it would be conducted without the guidance of a conservation and management plan with recovery objectives. This alternative would continue ongoing limited efforts to protect landscape connectivity to promote movement and genetic exchange among wolf populations.

The potentially adverse impact of Alternative 4 is that it would be unlikely to result in achieving a wolf population with long-term viability in Washington. Wolves would be managed cautiously to avoid mortality; but without proactive conservation measures as outlined in a wolf conservation and management plan, it is unlikely that they would sufficiently expand in numbers and geographic distribution to establish a viable population and re-occupy a significant portion of their former range in the state.

#### 4.1.2. Other Carnivores

Gray wolves in North America have long co-existed with a variety of other carnivores. How these species interact with wolves varies depending on the extent of dietary overlap, habitat, environmental conditions, and other factors. To date, no definitive research exists on the effects that wolves have on carnivore community structure or populations (USFWS 1994, Ballard et al. 2003). In Washington, wolves will share habitats occupied by a number of other carnivores, including cougars, coyotes, black bears, grizzly bears, bobcats, lynx, red foxes, river otters, mink, martens, weasels, skunks, wolverines, badgers, raccoons, and fishers. Direct interactions almost certainly will occur as wolves begin to reoccupy portions of their historical range in Washington and reestablish packs.

Information regarding the interactions between other carnivores and wolves is primarily observational and largely speculative when attempting to make predictions at the population or community level. Because wolves are wide-ranging and many carnivores are secretive in nature, collecting data on interactions is difficult. Observations to date suggest that wolves can reduce, or in rare cases eliminate, certain carnivores (such as coyotes) locally, but no evidence of long-term spatial partitioning of resources within an area has yet been detected (Ballard et al. 2003).

Interactions between wolves and coyotes have been discussed in the scientific literature more often than for other carnivores. Reestablishment of wolves has led to reductions in coyotes in some areas (e.g., Yellowstone and Grand Teton National Parks), but not at others (Ballard et al. 2003). Extirpation of coyotes by wolves can occur rarely (e.g., at Isle Royale National Park), but probably only under limited ecological circumstances, such as where immigration is prevented. Recent studies at Grand Teton and Yellowstone National Parks have detected declines in coyote densities of 33% and 39%, respectively, in areas reoccupied by wolves and are reflective of competition between the two species (Berger and Gese 2007). Localized or short-term decreases in coyote abundance can be even higher, such as a 50% loss in the Lamar Valley population of Yellowstone from 1996 to 1998 (Crabtree and Sheldon 1999). Resident coyote home ranges often overlap extensively with those of wolves, suggesting that coyotes may in fact derive some benefit from wolves by having a year-round source of ungulate carcasses on which to scavenge (Switalski 2003, Berger and Gese 2007, Merkle et al. 2009). Carrera et al. (2008) hypothesized that competition between the two species may be especially high where their diets substantially overlap. Berger and Gese (2007) hypothesized that wolves may have little or no effect on coyote densities outside of protected areas (where overall wolf densities are likely to be lower because of conflicts with humans), although this observation was based on few data.

Most wolf-grizzly bear interactions also involve fighting and chasing, which often take place at kill sites (Ballard et al. 2003). Encounters at kill sites usually appear to be won by grizzlies, whereas wolves usually win those at wolf dens. Each species is occasionally recorded killing the other (e.g., Jimenez et al. 2008, Hebblewhite and Smith 2010). Because grizzlies readily usurp ungulate kills made by wolves (e.g., Hebblewhite and Smith 2010), Servheen and Knight (1993) speculated that the

presence of wolves might be beneficial to threatened populations of grizzlies by supplementing their diet with greater amounts of protein through increased availability of ungulate carcasses. This may be especially true following mild winters, when ungulate carrion is normally far less available. Most reported encounters between wolves and black bears involved fighting or chasing one another, or wolves killing black bears. In a smaller number of interactions, wolves displaced black bears from kills. Wolves will seek out and kill black bears in their dens but often do not consume them, suggesting that interference competition exists between the two species.

Few observations of direct wolf-cougar interactions have been reported, but the two species do occasionally kill each other. However, cougars have been noted moving away from kills to avoid wolf contact (Akenson et al. 2005) and in general may avoid areas recently used by wolves (Kortello et al. 2007). Wolves also seek out and take over cougar kills, which may force cougars to increase their kill rates to replace lost prey (Hornocker and Ruth 1997, Murphy 1998, Kunkel et al. 1999, Kortello et al. 2007). In one area of central Idaho, cougars showed lower recruitment, fewer adults, and a disrupted social structure several years after recolonization by wolves, but other factors (declining prey populations, high hunter harvest, and a large forest fire) occurring simultaneously probably contributed to these effects (Akenson et al. 2005). In Banff National Park, Alberta, a largely wolf-related decline in the elk population resulted in cougars shifting their diets mainly toward deer and bighorn sheep (Kortello et al. 2007). Cougars also exhibited low annual survival and poor body condition during the period of wolf reestablishment, indicating that cougars were negatively affected by wolf recolonization (Hebblewhite and Smith 2010).

Wolves can affect some other carnivores, such as wolverines, red foxes (including Cascades red foxes), and fishers, in the same ways described above for bears and coyotes (Ballard et al. 2003). Increased availability of wolf-killed carcasses may benefit these species by providing more food for scavenging, particularly during the winter months. However, wolves sometimes kill some of these species during direct interactions. In areas where coyote abundance is reduced by wolves, predators such as red foxes, lynx, and bobcats may benefit from reduced competition with coyotes (Mech and Boitani 2003b). Additionally, some prey species of coyotes may increase, which has the potential to enhance populations of other medium-sized and small carnivores (Buskirk 1999).

- **Common to All Alternatives:** It is doubtful that wolves would affect the overall abundance or distribution of other carnivore species in Washington under the revised Preferred Alternative 2. The presence of wolves could alter the local distributions and behaviors of some carnivores as they attempt to avoid direct interactions with wolves or as they respond to changes in food availability as influenced by wolves. Such changes could favor some carnivore species over others. Wolves would also be likely to occasionally kill individuals of some species. Wolves could reduce coyote abundance in some locations, although the extent that this would occur outside of national parks is unknown. In some locations, grizzly and black bears, red foxes, fishers, and wolverines might benefit from the increased availability of carrion resulting from wolf kills of ungulates.

### 4.1.3. Ungulates

*Wolf Predation of Ungulates.* Ungulates are the primary food of wolves throughout their geographic range. Wolves tend to concentrate on species that are easier to capture or offer greater reward for the amount of capture effort expended, rather than on species that are most common. Diet can vary greatly among locations in the same region or even among packs living in the same vicinity (e.g., Kunkel et al. 2004, Smith et al. 2004) in response to differences in prey populations, seasonality, weather conditions, the presence of other predators, levels of human harvest, and other factors (Smith et al. 2004). In the central and northern Rocky Mountains of the United States and Canada, wolves commonly rely on elk as their primary prey, but deer and moose are more important in some areas. Moose are the major prey in much of British Columbia, including southern areas (G. Mowat, pers. comm.). Bighorn sheep and mountain goats are not regularly taken, probably because of little habitat overlap with wolves (Huggard 1993). Wolf diets in Washington are expected to be similar to those elsewhere in the region, with elk, deer, and moose being the primary prey species.

Wolves are selective hunters and usually choose more vulnerable and less fit prey. Young-of-the-year (especially in larger prey like elk and moose; Kunkel and Pletscher 1999, Boertje et al. 2009), older animals, and diseased and injured animals are taken in greater proportion than healthy, prime-aged individuals (Mech 1970, 2007, Kunkel et al. 1999, Mech and Peterson 2003, Smith et al. 2004, Sand et al. 2008, Hamlin and Cunningham 2009). Hunting success of wolves can be influenced by many factors, including pack size, terrain, habitat features, snow and other weather conditions, time of day, prey species, age and condition of prey, season, and experience (Mech and Peterson 2003, Hebblewhite 2005, Kauffman et al. 2007).

The impacts of wolves on prey abundance have been, and continue to be, widely debated (see Boutin 1992). Some common conclusions on this topic have been drawn. A number of studies indicate that wolf predation can limit ungulate prey populations (see citations in Chapter 5, Section A, of the recommended wolf conservation and management plan). Population-level effects result primarily through predation on young-of-the-year and are frequently enhanced when occurring in combination with other predators (e.g., bears) (Larsen et al. 1989, Barber-Meyer et al. 2008, Boertje et al. 2009). Elk declines in the greater Yellowstone ecosystem may result partially from the threat of wolf predation rather than actual wolf predation (Creel et al. 2009; but see White et al. 2011). In this case, female elk may respond to the presence of wolves by spending less time feeding and moving to safer habitats of poorer nutritional quality, resulting in reduced nutrition and lowered calf production that pushed the population downward.

As pointed out in many studies, numerous other factors (e.g., human harvest, severe winters, variable forage quality, fluctuating abundance of other predators and prey, disease, human disturbance/development, and vehicle collisions) also influence prey populations and complicate the conclusions that can be drawn about wolf-related impacts. Several studies have detected little or no effect from wolves on ungulate populations (Thompson and Peterson 1988, Bangs et al. 1989, Peterson et al. 1998; see Mech and Peterson 2003). Several reasons exist for why researchers have

failed to reach agreement regarding the significance of wolf predation on the dynamics of prey populations: (1) each predator-prey system has unique ecological conditions, (2) wolf-prey systems are inherently complex, and (3) population data for wolves and their prey are imprecise and predation rates are variable. Whether a prey population exists at or below its ecological carrying capacity is another important element in assessing the results of such studies (D. W. Smith, pers. comm.). In summary, wolf-prey interactions are probably best characterized as being exceedingly complex and constantly changing, as seen at Isle Royale National Park, Michigan, where wolf-moose relationships still cannot be predicted with confidence despite 50 years of detailed research on this subject (Vucetich and Peterson 2009).

A recent finding by Eberhardt et al. (2007) is that predation by wolves has a much lower overall impact on ungulate populations than does antlerless harvest by hunters. Wolves primarily prey on young of the year and older individuals beyond their prime, both of which have lower reproductive value, whereas antlerless removals by hunters are concentrated on adult females of prime age. Thus, wolf predation has considerably less effect on reproductive rates and growth of populations. Eberhardt et al. (2007) also remarked that conservative harvests of females are needed to maintain ungulate populations exposed to hunting and predation by multiple species of large carnivores at or near carrying capacity.

As with other predators, wolf predation has the potential to threaten some small populations of prey, which often have a limited capacity to increase. In Washington, examples of such populations potentially include mountain caribou and certain herds of bighorn sheep.

Broad predictions of the effect on ungulate populations from adding wolves to existing predation levels and hunter harvest are difficult to make because of localized differences in predator and ungulate abundance and harvest management practices within geographic areas. However, information from Idaho, Montana, and Wyoming, each of which currently supports about 340-700 wolves, provides useful insight on impacts that can be expected in Washington as wolves become reestablished. In general, wolves have had little or no effect on elk and deer abundance or hunter harvest across large areas of these states, where most populations remain stable or are above population objectives (see Chapter 5, Section B, of the recommended wolf conservation and management plan). Wolves have been linked to declining elk herds in several areas, but often they are one of several factors affecting the herds (e.g., changes in habitat, severe winter weather, and increasing populations of other predators). In some wolf-occupied areas, hunter success rates may have been reduced because of changes in elk behavior and habitat use rather than by actual declines in elk abundance.

*Ungulate Populations in Washington.* Overviews of ungulate species (elk, deer, moose, bighorn sheep, mountain goats, and mountain caribou) and populations occurring in Washington are presented in Chapter 5, Section B, of the recommended wolf conservation and management plan.

- **Common to All Alternatives.** Wolves are expected to have little or no effect on the abundance of elk, deer, and moose across most of Washington while wolves remain a state

listed species, as suggested by findings in neighboring states. However, abundance of elk, deer, and moose could decline in localized areas where wolves become numerous. In all cases, a number of other contributing factors will affect the extent of wolf impacts to ungulate populations. These include levels of human harvest, habitat quality, winter severity, fluctuating abundance of other predators and prey, human disturbance/development, and the amount of mortality from other sources such as disease and vehicle collisions. The presence of wolves could alter the habitat use, and hence local distributions, of elk, deer, and moose in some areas as they attempt to avoid direct interactions with wolves. Predation on bighorn and mountain goats is expected to be minor. Potential impacts to mountain caribou are discussed in Section 4.1.5.

- **Alternative 1.** Under this alternative, WDFW could consider reducing wolf abundance in localized areas where ungulate populations were below herd objectives, but not until wolves were downlisted to sensitive status and research had demonstrated that wolf predation was a key limiting factor for the ungulate population. This action could potentially benefit the ungulate population by reducing predation on it, but could have an adverse impact on the wolf population. Because this alternative would be less likely to result in the establishment of wolf populations in far western Washington, any effects to ungulates from wolf recovery would more likely occur in the Cascades and other areas of eastern Washington.
- **Revised Preferred Alternative 2.** Under this alternative, if WDFW determined that wolf predation was a primary limiting factor for an “at-risk” ungulate population, and the wolf population in that wolf recovery region was healthy (i.e., it exceeds the delisting objectives for that recovery region), WDFW could consider reducing wolf abundance in the localized area occupied by the ungulate population before state delisting occurs. This could potentially benefit the population by reducing predation levels on it.
- **Alternative 3.** Under this alternative, WDFW could consider reducing wolf abundance in localized areas with ungulate populations determined to be severely depressed and in danger of eventual extirpation, if research had determined that wolf predation was a key limiting factor for the ungulate population. This could potentially benefit the population by reducing predation levels on it. This alternative would require the establishment of a wolf population in the Pacific Coast recovery region, meaning that effects to ungulates from wolf recovery could occur to some extent in all regions of the state, in contrast to the other alternatives.
- **Alternative 4.** This alternative would continue wolf conservation and management activities as currently performed, without development of a wolf conservation and management plan. Wolves would remain listed as endangered until a recovery plan was developed. Human-caused mortality would probably remain relatively low because of protections for endangered species which would limit use of lethal control measures. Non-lethal removal of wolves to protect ungulates would not be expected. This alternative would continue current management for healthy ungulate populations through habitat improvement, harvest

management, and reduction of illegal hunting using existing WDFW game management plans. It is unknown what wolf numbers and their impacts on localized ungulate populations would be. Because Alternative 4 would be less likely to result in the establishment of a wolf population in a Pacific Coast recovery region, wolf-related impacts to ungulates in this area would not be expected.

#### 4.1.4. Ecosystem Effects

This element assesses the potential impacts that implementing the revised Preferred Alternative 2 could have on ecosystems, including plant communities, scavengers, and other wildlife, in Washington. Gray wolves affect ecosystem components through a variety of direct and indirect processes, including: (1) limitation of herbivore prey abundance and changes in prey behavior, (2) removal of inferior prey individuals and stimulation of prey productivity, (3) increasing food availability for scavengers and small carnivores, and (4) enhancement or limitation of some non-prey abundance (Mech and Boitani 2003b). However, the ecological affects of wolf predation on food webs are complex and interact with other biotic and abiotic factors, especially at lower trophic levels, and therefore generally remain poorly understood and difficult to predict (Berger and Smith 2005, Hebblewhite and Smith 2010).

Regulation of large herbivore abundance and behavior by wolves can result in alterations to vegetation patterns (structure, succession, productivity, species composition, and species diversity), thereby potentially affecting many wildlife species residing in an ecosystem (Berger and Smith 2005). Research at Yellowstone and Banff national parks has linked wolf predation on elk and associated changes in elk density and behavior to the localized resurgence of woody browse species such as willows and aspen (Smith et al. 2003, Ripple and Beschta 2004, 2007, Beschta 2005, Beschta and Ripple 2010, Hebblewhite and Smith 2010). (However, note that two recent studies [Kauffman et al. 2010, Tercek et al. 2010] dispute some of these findings.) This in turn has allowed beaver numbers to increase and will probably result in greater amounts of foraging and nesting habitat for various birds and other species. At Grand Teton National Park, Berger et al. (2001) hypothesized that overbrowsing of riparian zones by moose following the eradication of wolves and grizzly bears had produced changes in vegetation structure resulting in pronounced reductions or elimination of a number of neotropical migrant songbird species. Reduced tree and shrub coverage in riparian areas may also increase stream temperatures and erosion, thereby potentially harming numerous aquatic species.

Eradication of wolves has possibly produced a number of important ecological changes in Olympic National Park in northwestern Washington. Initial research by Beschta and Ripple (2008) suggests that overbrowsing by elk during the past century or so has caused substantial changes in riparian plant communities, including severe declines in the recruitment of black cottonwood and bigleaf maple. This in turn may have caused increased riverbank erosion and channel widening. Probable reductions in the amount of large woody debris in river channels during this period have likely reduced rearing habitat for salmon, steelhead, and resident fish. These changes in river ecology have

probably also lowered the abundance of aquatic invertebrate prey (including emerging adult insects) available for fish, birds, and bats. Confirmation of these cause and effect relationships is needed through additional research (P. Happe, pers. comm.).

Wolf-related reductions in coyote abundance (Section 4.1.2) may result in population changes among other medium-sized and small carnivores, either directly through reduced predation by coyotes or indirectly through adjustments in prey availability. For example, reduced interference competition with coyotes may increase the abundance of red foxes (Mech and Boitani 2003b). Similarly, wolf-related reductions in coyotes may result in increased survival for some prey species consumed by coyotes (e.g., pronghorn; Berger et al. 2008, Berger and Conner 2008). Increased availability of wolf-killed carcasses can benefit a number of scavenging species, such as ravens, magpies, jays, golden eagles, and bald eagles, especially during winter when other foods become more scarce (Smith et al. 2003). At Yellowstone National Park, at least 12 vertebrate species scavenge at wolf-killed carcasses, with five (bald and golden eagles, coyotes, ravens, and magpies) visiting nearly every wolf kill (Wilmers et al. 2003a, 2003b). At Banff National Park, at least 20 vertebrate species fed off wolf kills, with ravens, coyotes, magpies, martens, wolverines, and bald eagles visiting most often (Hebblewhite and Smith 2010). Increased availability of wolf-killed carcasses in Washington may be particularly beneficial for golden eagles, which may currently be food limited because of declines in jackrabbits and perhaps other prey (J. Watson, pers. comm.).

Most research on wolf-carnivore community interactions has been conducted in national parks or other protected areas. It remains unclear whether the ecological impacts of wolves are as perceptible in less pristine landscapes that have been influenced by livestock grazing or other human activities, or in areas with lower wolf densities (L. D. Mech, pers. comm.). Climate and habitat productivity are other factors that also may affect the strength of ecological changes resulting from the reestablishment of wolves (Rooney and Anderson 2009). Predictions about wolf-driven ecosystem changes and benefits in Washington (i.e., where effects occur, species affected, magnitude of changes, etc.) are difficult to make because of the uncertainty regarding the ultimate population size, density, and distribution of wolves in the state. These types of changes and benefits would be expected in areas where wolves achieve stable populations at relatively high density, but it is unknown whether Washington will support high-density populations under contemporary landscape conditions.

- **Alternative 1.** The more aggressive use of lethal control at earlier stages of recovery to resolve wolf-related conflicts in Alternative 1 would likely result in smaller numbers of wolves and greater instability of packs. This, in turn, would limit opportunities for ecosystem effects of the types described in this section. Because this alternative would be less likely to result in the establishment of wolf populations in far western Washington, any ecosystem effects accompanying wolf recovery would be more likely to occur in areas of eastern Washington and in the Cascades.

- 1     ▪ **Revised Preferred Alternative 2.** The recovery objectives and management of wolf-related  
2       conflicts of the revised Preferred Alternative 2 would likely result in moderate numbers of  
3       wolves and moderate pack stability in Washington, thus allowing some opportunities for  
4       wolf-related ecosystem effects to develop. Because this alternative would be less likely to  
5       result in the establishment of wolf populations in far western Washington, any ecosystem  
6       effects accompanying wolf recovery would be more likely to occur in areas of eastern  
7       Washington and in the Cascades.
- 8     ▪ **Alternative 3.** Management of wolf-related conflicts would be less aggressive under  
9       Alternative 3, with most types of lethal control delayed until the later stages of recovery or  
10      delisting. This would likely result in larger numbers of wolves and greater pack stability,  
11      which would increase opportunities for ecosystem effects of the types described in this  
12      section. This alternative would require the establishment of a wolf population in the Pacific  
13      Coast recovery region, making it more likely that wolf-related ecosystem effects would occur  
14      to some extent in all regions of the state.
- 15    ▪ **Alternative 4 – No Action (Current Management).** It is unknown how wolf recovery  
16      would progress under this alternative, but human-caused mortality resulting from control  
17      actions would be expected to remain relatively low under this alternative because of  
18      restrictions on lethal control by livestock owners and for the purpose of managing ungulate  
19      populations. This could result in somewhat larger numbers of wolves and greater pack  
20      stability, which would increase opportunities for ecosystem effects of the types described in  
21      this section. Because this alternative would be much less likely to result in the establishment  
22      of wolf populations in far western Washington, any ecosystem effects accompanying wolf  
23      reestablishment would likely be limited to areas of eastern Washington and the Cascades.

#### 24   4.1.5. Unique Species

25   Washington contains a number of state and federal listed species (endangered, threatened, sensitive),  
26   candidate species, and species of concern, with some of these occurring in areas likely to be  
27   eventually occupied by wolves. Interactions between wolves and these species are discussed in this  
28   section. Additional discussion for listed or candidate carnivores and birds of prey (i.e., grizzly bears,  
29   lynx, wolverines, fishers, bald eagles, and golden eagles) appears in Sections 4.1.2 and 4.1.4.

30   Washington's only population of mountain caribou, the Selkirk Mountains herd, spends most of its  
31   time in the British Columbia portion of its range, with members infrequently entering Washington.  
32   The herd increased from 33 caribou in 2004 to 46 caribou in 2009. Caribou distribution in  
33   Washington is restricted primarily to the Salmo-Priest Wilderness Area in northeastern Pend Oreille  
34   County. The area is characterized by high elevations and extensive closed-canopy forests, and  
35   therefore supports relatively low densities of other ungulate species. Hence, few wolves are  
36   expected to reside in the Salmo-Priest, meaning that predation on caribou would probably occur  
37   infrequently. Nevertheless, any wolf-related losses to the herd would have a significant impact on

the population. In British Columbia, recent declines of woodland caribou populations have been linked to the expansion of moose populations and the subsequent increase of wolves, which has resulted in greater wolf predation on caribou (Wittmer et al. 2005, Stotyn et al. 2007). Loss of mature forests and fragmentation of winter habitat may also make woodland caribou more vulnerable to wolves.

In Washington, Columbian white-tailed deer occur along the lower Columbia River in Wahkiakum and Cowlitz counties (Figure 10). The population in Washington numbered about 235 animals in 2009 (Meyers 2009) and is generally located near human habitation. Predation levels on this subspecies by wolves are difficult to predict, but could potentially harm this deer's recovery in the state.

Wolves feed on many different small prey species (e.g., mice, tree squirrels, muskrats, woodchucks, grouse, songbirds; van Ballenberghe et al. 1975, Fritts and Mech 1981, Boyd et al. 1994, Arjo et al. 2002), especially in the summer when ungulates become less available, but small prey never comprises a significant portion of the diet. A number of listed and candidate species in Washington fall into this size category and might be rarely caught and eaten by wolves. These include Merriam's shrew, pygmy rabbit, white-tailed jackrabbit, black-tailed jackrabbit, western gray squirrel, Washington ground squirrel, Townsend's ground squirrel, Mazama pocket gopher, gray-tailed vole, greater sage-grouse, and sharp-tailed grouse. Many of these species occur in open habitats (i.e., shrub-steppe, grasslands, prairies, farmland) that are unlikely to be recolonized to any significant extent by wolves in Washington. Although not state or federally listed, Olympic marmots have been declining in recent years and are now estimated to total fewer than 1,000 animals (Griffin et al. 2008). Coyote predation is probably the main threat to the species (S. C. Griffin, pers. comm.). Coyotes were historically rare or absent from the Olympic Peninsula when wolves were widespread in western Washington (Taylor and Shaw 1929, Scheffer 1995). Although recolonization of the Olympic Mountains by wolves might result in additional predation pressure on Olympic marmots, it more likely could benefit marmots by reducing coyote abundance.

Impacts of wolves on listed species or other species of concern would probably have few significant adverse impacts on any of these species in Washington in the foreseeable future, with the possible exception of mountain caribou. Recovery of wolves could benefit some species through the ecosystem processes described in Section 4.1.4, although this is difficult to predict and would depend on where wolves become reestablished and in what numbers.

- **Common to All Alternatives.** Under all alternatives, research would be used to identify and determine the extent of conflicts between wolves and federal or state listed or candidate species or other species of concern. Where conflicts exist, response plans would be developed to resolve conflicts. Consultation and coordination with the U.S. Fish and Wildlife Service would be necessary in planning and implementing appropriate responses if wolves remained federally listed or if conflicts involved federally listed species.

- 1       ▪ **Alternative 1.** In this alternative, potential response options for addressing conflicts could  
2 include non-lethal measures (e.g., moving of wolves) while wolves were listed as endangered  
3 and threatened, and both non-lethal and lethal methods after wolves reached sensitive status.  
4 Alternative 1 would continue existing efforts to maintain and restore landscape connectivity  
5 for wolves and other large-ranging carnivores, including listed species such as grizzly bears,  
6 lynx, wolverines, and fishers. This activity would be limited to existing efforts, and as such,  
7 populations of listed carnivores would not be as likely to benefit from increased gene flow  
8 among populations, increased immigration into existing populations with demographic  
9 concerns (e.g., low survival or productivity), and increased dispersal into unoccupied areas  
10 with suitable habitat. Because this alternative would be less likely to result in the  
11 establishment of wolf populations in far western Washington, any effects to federal or state  
12 listed or candidate species or other species of concern from wolf recovery would more likely  
13 occur in eastern Washington and the Cascades.
- 14       ▪ **Revised Preferred Alternative 2.** Under this alternative, if WDFW determined that wolf  
15 predation was a primary limiting factor for an “at-risk” ungulate population (e.g., mountain  
16 caribou), and the wolf population in that wolf recovery region was healthy (i.e., it exceeds the  
17 delisting objectives for that recovery region), WDFW could consider reducing wolf  
18 abundance in the localized area occupied by the ungulate population before state delisting  
19 occurs. This could potentially benefit the population by reducing predation levels on it. The  
20 revised Preferred Alternative 2 would expand efforts to maintain and restore landscape  
21 connectivity for wolves. This might benefit a number of listed species such as grizzly bears,  
22 lynx, wolverine, and fishers, which would likely use the same corridors for travel. It could  
23 also benefit population viability in these species by increasing gene flow among populations,  
24 increasing immigration into existing populations with demographic concerns (e.g., low  
25 survival or productivity), and increasing dispersal into unoccupied areas with suitable habitat.  
26 Because this alternative would be less likely to result in the establishment of wolf  
27 populations in far western Washington, any effects to listed or candidate species or other  
28 species of concern from wolf recovery would more likely occur in eastern Washington and  
29 the Cascades.
- 30       ▪ **Alternative 3.** Alternative 3 would expand efforts to maintain and restore landscape  
31 connectivity for wolves. Other listed species, such as grizzly bears, lynx, wolverine, and  
32 fishers, would likely use the same corridors for travel. This would benefit population  
33 viability in these species by increasing gene flow among populations, increasing immigration  
34 into existing populations with demographic concerns (e.g., low survival or productivity), and  
35 increasing dispersal into unoccupied areas with suitable habitat. This alternative would  
36 require the establishment of wolves in a Pacific Coast recovery region, which could bring  
37 wolves into greater contact with Olympic marmots in the Olympic Mountains and Columbia  
38 white-tailed deer along the lower Columbia River. Olympic marmots and Columbia white-  
39 tailed deer might benefit from wolf recovery, which could lead to reduced coyote abundance  
40 and predation, or might experience additional predation pressure from wolves.

- 1       ▪ **Alternative 4 – No Action (Current Management).** Most types of lethal control of  
2       wolves would be not be used until after delisting under the no action alternative. It is  
3       unknown what wolf numbers and their impacts on other listed species might be under this  
4       alternative. Alternative 4 would continue existing efforts to maintain and restore landscape  
5       connectivity for wolves and other large-ranging carnivores, including listed species such as  
6       grizzly bears, lynx, wolverines, and fishers. Because this activity would be limited to ongoing  
7       efforts, populations of listed carnivores would not be as likely to benefit from increased gene  
8       flow among populations, increased immigration into existing populations with demographic  
9       concerns (e.g., low survival or productivity), and increased dispersal into unoccupied areas  
10      with suitable habitat. Because this alternative would be unlikely to result in the  
11      establishment of wolf populations in far western Washington, any effects to federal or state  
12      listed or candidate species or other species of concern from wolf recovery would more likely  
13      occur in areas of eastern Washington or the Cascades.

## 15   **4.2. Built Environment**

16  
17   The “built environment” elements in WAC 197-444 address environmental impacts to (a)  
18   environmental health, (b) land and shoreline use, and (c) transportation. Related to the alternatives  
19   considered for the recommended wolf conservation and management plan and for this analysis,  
20   these include: human safety, land use, recreation such as hunting, wildlife watching and other  
21   backcountry recreation, and agricultural crops (livestock). Because this is a non-project action, the  
22   analysis of environmental impacts resulting from development of the wolf conservation and  
23   management plan is broad and most effects are indirect. Possible indirect environmental impacts of  
24   the alternatives are speculative because the non-project aspects of these four plan alternatives lack  
25   very specific actions. The likely adverse or beneficial impacts to the built environment of  
26   Alternatives 1-4 are discussed below.

### 28   **4.2.1. Human Safety**

29  
30   Although wolves are large carnivores capable of inflicting serious injury to people, wild wolves  
31   generally fear people and rarely pose a threat to human safety in North America. Attacks on  
32   humans by wolves are quite rare compared to those by other species, such as dogs, bears, and  
33   cougars (see Chapter 7 of the recommended wolf conservation and management plan). Wolves can  
34   gradually lose their fear of people through increasingly frequent contact and access to human foods.  
35   Habituated wolves of this type are involved in the majority of cases of aggression toward people  
36   (Linnell et al. 2002, McNay 2002).

37  
38   Because of the long absence of gray wolves from Washington, most people in the state are  
39   unfamiliar with wolves and wolf behavior. Hence, addressing public safety concerns and providing  
40   information on wolf behavior are important steps in achieving conservation and tolerance of wolves  
41   by citizens. Various groups of people with a higher likelihood of coming in contact with wolves in

the wild include, but are not limited to, hunters, trappers, rural residents, recreationists, outfitters and guides, forest workers/contractors, other natural resource workers, and utility workers. Some members of these groups may welcome seeing wolves and may seek them out, while others may consider wolves as problematic to their activities. Regardless, user groups should be informed about wolves. To reduce concerns over safety, efforts should be made to inform rural residents, rural workers, and backcountry users of ways for reducing the likelihood of encounters with wolves and methods for preventing habituation toward people.

- **Common to All Alternatives:** Under all alternatives, wolves would pose a very low risk to human safety. In each alternative, if wolves were to pose a threat to human safety, WDFW or cooperating agencies would take immediate action to resolve the situation. Outreach and education will be used to inform people about ways to avoid or respond to interactions with wolves, as well as actions that can be taken to prevent habituation of wolves. Alternatives 1 and 4 would continue outreach and education at existing levels, whereas the revised Preferred Alternative 2 and Alternative 3 would expand these efforts using wolf specialists. It is anticipated that increased outreach and education efforts would help reduce wolf-human conflicts.

#### 4.2.2. Land Use

Wolves are habitat generalists, but in the western United States occur most frequently in forests (USFWS 2009). Wolves are also fairly tolerant of moderate amounts of human disturbance, even in the vicinity of active wolf dens (Thiel et al. 1998, Frame et al. 2007). Hence, restrictions on land use practices have not been necessary to achieve wolf conservation in Idaho, Montana, and Wyoming (USFWS 2009). For these reasons, wolf reestablishment in Washington is not expected to result in the imposition of any land use restrictions to protect and conserve wolves other than those that occasionally may be needed to temporarily protect den sites from malicious or careless destruction during the denning period.

In neighboring states with wolves, no restrictions have been placed on the forest products industry with regard to timber management and logging to protect wolves. On private forestlands in Washington, no restrictions are anticipated with the possible exception of delaying timber harvests near occupied den sites until after the completion of the denning season. The Washington Department of Natural Resources currently has a provision under the Washington State Forest Practices Act, Critical Habitats Rule for threatened and endangered species (WAC 222-16-080) for gray wolves. Forest practices on state and private land where harvesting, road construction, or site preparation is proposed within 1 mile of a known active wolf den, documented by WDFW, between the dates of March 15 and July 30, or 0.25 mile from the den at other times of the year, are designated as a Class IV-Special and require an extra 14 days of review, and are subject to State Environmental Policy Act (SEPA) review. The rule was established in 1992, but much has been learned since then about habitat issues involving wolves in neighboring states. The revised Preferred

Alternative 2 recommends that this newer information be reviewed to determine if the rule should be modified to reflect current knowledge.

WDFW has no legal authority to implement land use restrictions on public land it does not manage or on private land (with the exception of hydraulic permits). Land management agencies can and may adopt seasonal or area restrictions independently from WDFW. However, experience in Idaho, Montana, and Wyoming has shown that no restrictions, other than those occasionally needed to temporarily prevent excessive disturbance of occupied den sites, have been necessary to conserve wolves on public and private lands. If wolves were denning on private property, WDFW would advise the landowner of the presence of the den and work with the landowner regarding planned activities near the den site during the denning period. Under certain circumstances, a landowner might be asked to temporarily delay an activity near a den during the denning period, especially while wolves remain state-listed.

- **Common to All Alternatives:** Wolf recovery and management activities in Washington would not affect land use under any of the four alternatives. As described above, no restrictions, other than those occasionally needed to temporarily prevent excessive disturbance of occupied den sites, have been necessary to conserve wolves on public and private lands in other western states. No such restrictions should be needed in Washington.

#### 4.2.3. Recreation

Three types of recreation are analyzed with respect to possible indirect effects of the four alternatives for a wolf conservation and management plan in Washington: hunting, wildlife watching, and other types of backcountry recreation.

##### 4.2.3.1. Hunting

Healthy and abundant prey populations are important for maintaining hunting opportunities that contribute to many local economies in Washington, especially in more rural regions. The challenge for wildlife managers is to manage for healthy ungulate population levels that also sustain wolves, other carnivores, harvest opportunities for the public, and subsistence and ceremonial needs of treaty tribes.

*Big Game Hunting in Washington.* Hunting, especially for big game (ungulates, cougars, black bears), is an important recreational activity in Washington. The 2006 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation, which is based on household interviews nationwide, estimated that 187,000 residents of Washington, or 3.8% of the state's population aged 16 years old and older, were hunters (for either big or small game, or both; USFWS and USCB 2008). This is below the national average of 5.5% of the population aged 16 years and older. An estimated 182,000 hunters hunted in Washington in 2006, with an estimated 179,000 residents and 3,000 non-residents participating. Hunters spent nearly 2.13 million days hunting for all species in the state in 2006. Big

game hunting represents some of the most highly valued hunting in Washington, with an estimated 90% of hunters hunting ungulates in 2006 (USFWS and USCB 2008). By comparison, only an estimated 23% and 11% of hunters sought small game and migratory birds, respectively. Seventy-nine percent of total hunter days involved big game hunting, 14% small game hunting, and 7% migratory birds in 2006.

Deer and elk hunting are the predominant forms of big game hunting in Washington, both in terms of the number of hunters participating and total days spent hunting. Numbers of deer hunters and deer hunting days averaged about 141,500 and 845,000 per year, respectively, during the decade from 1997 to 2006 (WDFW 1997-2006). Despite some sizeable yearly increases and decreases, deer hunter numbers remained almost stable (increase of 0.7%) during this period, whereas hunting days decreased 18.8%. Deer harvest remained robust, averaging 38,100 deer annually during 1997 to 2006. For elk, numbers of hunters and hunting days averaged about 74,400 and 412,400 per year, respectively, during these years in Washington. Both figures showed net increases of 15.4% and 19.0%, respectively, from 1997 to 2006, although both showed gradual decline after 2000. Despite these declines, elk harvest has remained strong, averaging 7,390 animals annually from 1997 to 2006. Hunting opportunities for moose, bighorn sheep, and mountain goats in Washington are far more limited than for deer and elk. All three species are hunted only through special permit drawings, with fewer than 100 permits issued annually for each.

*Recent Impacts of Wolves on Big Game Hunting in Neighboring States.* To date, wolves have not resulted in any sizable losses of hunter opportunity in Montana, although seasons for antlerless elk in some locations (e.g., north Yellowstone, Gallatin, West Fork of the Bitterroot) have been reduced or eliminated to compensate for mortality from multiple sources including wolves and other factors causing lowered herd productivity (MFWP 2007; C. Sime, pers. comm.). Many parts of the state offer liberal opportunities for elk harvest, including two-thirds of the hunting districts in southwestern Montana, all of which support wolves (J. Gude, pers. comm.). However, lethal wolf control in many of these areas to reduce conflicts with livestock may keep local wolf densities low enough to minimize impacts on elk herds. Wolf impacts on deer and other ungulates have not been well documented to date (C. Sime, pers. comm.). Montana Fish, Wildlife & Parks has not experienced any declines in hunting generated revenue, license sales, or hunter success on a statewide level because of wolf presence (C. Sime, pers. comm.).

Wolf impacts on big game hunting in Idaho have not been well quantified. IDFG (2010a) recently reported that 23 of 29 elk management zones in Idaho were within or above management goals for female elk, suggesting that harvestable surpluses of elk remain in most areas of the state. At least two elk management units (e.g., Lolo, Sawtooth) where wolves were the primary cause of death of female elk (IDFG 2010a) have experienced reductions in hunter harvest and participation since 2005 (Rachael 2010). IDFG (2008) speculated that wolf predation may be causing reductions in elk harvest in some parts of the state, even where elk populations are not declining, by changing the behavior and habitat use of elk during the hunting season. As observed elsewhere (Creel and

Winnie 2005, Mao et al. 2005), Idaho's elk may now be spending more time in forested areas, on steeper slopes, and at higher elevations than before wolf reintroductions, making it more difficult for hunters to find animals. Changes in herding behavior and movement rates (Proffitt et al. 2009) may also affect hunting success. Wolves are believed to be a main factor in the recent decline of moose in the Lolo zone, but their impact on moose abundance in other parts of Idaho is not well known (J. Rachael, pers. comm.). Moose populations in some areas may be more directly affected by habitat changes, harvest levels, or other causes (S. Nadeau, pers. comm.). The impact of wolves on deer and other ungulates in the state appears negligible (J. Rachael, pers. comm.; S. Nadeau, pers. comm.). Big game revenue and tag sales to resident and non-resident hunters have remained stable in recent years for the Idaho Department of Fish and Game (B. Compton, pers. comm.; S. Nadeau, pers. comm.). Some hunters have indicated that they would not return to their hunting areas because of real or perceived impacts of wolves, but whether this has produced significant changes in hunter activity has been difficult to assess.

In Wyoming, at present, there are no definitive data showing decreased hunter harvest or opportunity due to wolf predation on elk or moose (WGFC 2008).

*Impacts of Wolves on Hunting in Washington.* The effect on ungulate populations from adding wolves to existing predation levels and hunter harvest is difficult to predict in the state because of localized differences in predator abundance, ungulate abundance, and harvest management practices within each geographic area. However, information from Idaho, Montana, and Wyoming, each of which currently supports about 340-700 wolves, provides useful insight on impacts that can be expected in Washington as wolves reestablish. In general, wolves have had little or no effect on elk and deer abundance or hunter harvest across large areas of Idaho, Montana, and Wyoming, where most populations remain stable or are above population objectives. Wolves have been linked to declining elk herds in several areas, but often they are one of several factors affecting the herds (e.g., changes in habitat, severe winter weather, and increasing populations of other predators). In some wolf-occupied areas, hunter success rates may have been reduced because of changes in elk behavior and habitat use rather than by actual declines in elk abundance.

- **Alternative 1.** Under Alternative 1, ungulates would be managed to maintain healthy population levels through standard practices (as described in game management plans), adjustments to recreational harvest levels to benefit wolf conservation would not occur, and management of ungulate populations that are below herd objectives could involve removal of wolves under certain limited circumstances after wolves reached sensitive status. Together, these actions would likely result in smaller numbers of wolves, which would probably result in fewer localized impacts to ungulate populations from wolves, and few adjustments of harvest levels (e.g., reductions in antlerless take, reduced availability of special permits, and shortened hunting seasons) to benefit wolves. Because Alternative 1 would be less likely to result in the establishment of wolf populations in a Pacific Coast recovery region, few if any wolf-related impacts to hunting would occur in that part of the state.

- 1     ▪ **Revised Preferred Alternative 2.** This alternative would manage for healthy ungulate prey  
2     populations through habitat improvement, harvest management and reduction of illegal  
3     hunting, consistent with game management plans. This could result in some management  
4     restrictions being placed on harvest levels (e.g., reductions in antlerless take, reduced  
5     availability of special permits, and shortened hunting seasons) in localized areas with wolves.  
6     Under this alternative, management of at-risk ungulate populations could consider removal  
7     of wolves regardless of wolf status if WDFW determines that wolf predation is a primary  
8     limiting factor of the populations and the wolf population in that recovery region is healthy  
9     (i.e., it exceeds the delisting objectives for that recovery region). Although hunting of at-risk  
10    populations would likely already be prohibited or tightly restricted, removal of wolves could  
11    enhance future hunting opportunities. Because revised Preferred Alternative 2 would be less  
12    likely to result in the establishment of wolf populations in a Pacific Coast recovery region,  
13    few if any wolf-related impacts to hunting would occur in that part of the state.
- 14    ▪ **Alternative 3.** Under this alternative, WDFW would continue to manage for healthy  
15    ungulate populations through standard practices, but would also consider reductions in  
16    levels of recreational harvest (possibly through reductions in antlerless take, reduced  
17    availability of special permits, or shortened hunting seasons) to benefit wolf conservation in  
18    wolf recovery regions until recovery objectives for the region were met. Combined, these  
19    actions would likely result in larger numbers of wolves, which would possibly result in  
20    greater localized impacts to ungulate populations from wolves. Under this alternative,  
21    management of at-risk ungulate populations could involve removal of wolves under certain  
22    limited circumstances after delisting occurs. Although hunting of at-risk populations would  
23    likely already be prohibited or tightly restricted, removal of wolves could enhance future  
24    hunting opportunities. Under Alternative 3, wolf-related impacts to hunting could occur in  
25    the Pacific Coast area of Washington as well as in other regions of the state because of  
26    recovery objectives for wolves in that region.
- 27    ▪ **Alternative 4 – No Action (Current Management).** Under this alternative, WDFW  
28    would continue to manage for healthy ungulate populations through standard practices per  
29    game management plans. Most types of lethal control of wolves would be not be used until  
30    after delisting under this alternative. Under this alternative, it is difficult to predict wolf  
31    abundance or what resulting impacts wolves might have on hunting. Game management  
32    plans could be adjusted to modify harvest levels if localized ungulate populations were  
33    declining below herd objectives. Because Alternative 4 would be less likely to result in the  
34    establishment of wolf populations in a Pacific Coast recovery region, wolf-related impacts to  
35    hunting in this area would also be less likely.

#### 36 4.2.3.2. Wildlife Watching

37 Wildlife viewing is hugely popular in the United States. According to the 2006 National Survey of  
38 Fishing, Hunting, and Wildlife-Associated Recreation, more than 71 million Americans 16 years old

and older (31% of the U.S residents in this age bracket) participated in wildlife watching activities (i.e., observing, feeding, photographing, etc.; includes fish viewing) in 2006 (USFWS and USCB 2007). Of these, almost 23 million people took trips more than one mile from their homes specifically to see wildlife. Participation in wildlife viewing increased 8% nationally from 2001 to 2006, in contrast to fishing and hunting, which fell 12% and 4%, respectively. Seventy percent (16.2 million people) of the wildlife watchers traveling away from home observed, fed, or photographed land mammals, with 56% (12.8 million people) specifically interested in large mammals such as deer, bears, and coyotes.

In Washington during 2006, an estimated 2.33 million people 16 years old and older participated in some form of wildlife watching, which ranked the state 11th in the nation for participation (USFWS and USCB 2007, 2008). About 2 million participants were state residents (40% of the state's total population in this age group), with the remainder being non-residents. An estimated 628,000 Washington residents and 331,000 non-residents in this age group traveled more than one mile away from home to view wildlife in Washington during the year. Residents spent an estimated 8.0 million days (88% of the total; average of 12.7 days per person) and non-residents spent an estimated 1.1 million days (12%; average of 3.4 days per person) away from home watching wildlife in Washington during the year. Overall, wildlife watchers outnumbered hunters and anglers combined by nearly three times in Washington.

In addition to the wildlife watching opportunities that already exist in the state, Washington has potential to develop viewing opportunities for wolves (defined here as seeing, hearing, or otherwise experiencing wolves), depending on where and how many wolves eventually become reestablished in the state, their behavior, and human behavior in response to them (see Chapter 14, Section D, of the recommended wolf conservation and management plan). Viewing potential could eventually exist at several locations, such as Mt. St. Helens National Volcanic Monument and in the Methow Valley. Wolf-based tourism also has some potential in other areas of the state (e.g., some national forest lands) where wolves might not be frequently seen, but would be regularly present and relatively safe from harassment. Modest numbers of visitors might be attracted to such areas in hopes of possibly seeing or hearing a wolf or finding wolf sign.

In contrast to the scenario presented above, any substantial wolf-related declines in the public's ability to view elk, deer, and other ungulates caused by changes in behavior or abundance could reduce overall wildlife viewing opportunities in some localized areas. However, this problem has not been reported from other localities with wolves in the lower 48 states and is not expected to occur over large areas of Washington.

- **Alternative 1.** The more aggressive management of wolf-related conflicts with livestock and ungulates with lethal control implemented at earlier stages of recovery is likely to result in smaller numbers of wolves and greater instability of packs, which could in turn limit opportunities to see or hear wolves. However, it might retain recreational viewing opportunities for some ungulate populations. Because Alternative 1 would be less likely to

result in the establishment of wolf populations in a Pacific Coast recovery region, any opportunities for wolf watching would most likely occur in eastern Washington and the Cascades. This alternative would also retain wolf-related education and outreach at current levels, which might limit public interest in watching or hearing wolves.

- **Revised Preferred Alternative 2.** This alternative would result in moderate numbers of wolves and moderate pack stability in Washington, which could allow the development of opportunities to see or hear wolves in some areas. Because the revised Preferred Alternative 2 would be less likely to result in the establishment of wolf populations in a Pacific Coast recovery region, any wildlife watching opportunities for wolves would most likely occur in eastern Washington and the Cascades. This alternative would expand wolf-related education and outreach, which could increase public interest in watching or hearing wolves.

- **Alternative 3.** Delays in lethal control until the later stages of recovery or delisting under this alternative would likely result in larger numbers of wolves and greater pack stability, which could increase opportunities to watch and hear wolves over larger portions of their range in Washington. This alternative would require the establishment of wolves in a Pacific Coast recovery region, which could bring wolf watching opportunities to this region, including Olympic National Park. This alternative would expand wolf-related education and outreach, which could increase public interest in watching or hearing wolves.

- **Alternative 4 – No Action (Current Management).** Most types of lethal control of wolves would not be used until after delisting under the no action alternative. Management of wolf-related conflicts involving livestock and ungulates would be less aggressive under Alternative 4, with most types of lethal control delayed until after delisting. This could result in somewhat larger numbers of wolves and greater pack stability, which could allow opportunities for wolf watching to develop in some areas. Because this alternative would be unlikely to result in the establishment of wolf populations in a Pacific Coast recovery region, any wolf watching opportunities would most likely occur in eastern Washington and the Cascades (as in Alternative 3). This alternative would also retain wolf-related education and outreach at current levels, which might not increase public interest in watching or hearing wolves.

#### 4.2.3.3. Other Types of Backcountry Recreation

In addition to hunting and wildlife watching, wolves could potentially affect other forms of backcountry recreation, such as hiking, camping, horse use, and cross country skiing. Some members of these groups may welcome seeing wolves and may seek them out, while others may consider wolves as problematic to their activities because of perceived concerns over personal safety. Thus, wolf presence could possibly attract some visitors to national forests and other wildland areas, while preventing others from visiting. Reduced visitation to backcountry areas because of wolves

has not been reported in other localities occupied by wolves in the lower 48 states and is therefore unlikely to occur in Washington.

Backcountry recreationists should be informed about wolves to alleviate perceived concerns over personal safety and to inform them of methods for reacting to wolves during encounters, reducing the likelihood of encounters, and preventing wolf habituation toward people. Outreach and education strategies for accomplishing these goals are essential to achieving the conservation and management goals for wolves and are presented in greater detail in Chapter 12, Task 9, of the draft wolf conservation and management plan.

- **Alternative 1.** Management actions under this alternative that would result in smaller numbers of wolves could in turn result in the public experiencing fewer backcountry encounters with wolves. Alternative 1 would be less likely to result in the establishment of wolf populations in a Pacific Coast recovery region, so backcountry encounters with wolves would most likely occur in eastern Washington and the Cascades. Wolf-related outreach and education would continue at current levels under this alternative, which would limit the amount of information on wolves that backcountry users would receive.
- **Revised Preferred Alternative 2.** This alternative would result in moderate numbers of wolves in Washington, which could result in the public experiencing some backcountry encounters with wolves. Because the revised Preferred Alternative 2 would be less likely to result in the establishment of wolf populations in a Pacific Coast recovery region, backcountry encounters with wolves would most likely occur in eastern Washington and the Cascades. This alternative would increase the amount of wolf-related education and outreach provided to the public, which would expand the amount of information on wolves that backcountry users would receive.
- **Alternative 3.** Management of wolf-related conflicts under Alternative 3 would likely result in the establishment of larger numbers of wolves in Washington, which would result in the public experiencing greater numbers of backcountry encounters with wolves. Because Alternative 3 would be more likely to result in the establishment of wolf populations in a Pacific Coast recovery region, backcountry encounters with wolves would likely occur in this region as well as in eastern Washington and the Cascades. This alternative would increase the amount of wolf-related education and outreach provided to the public, which would greatly expand the amount of information on wolves that backcountry users would receive.
- **Alternative 4 – No Action (Current Management).** Most types of lethal control of wolves would not be used until after delisting under the no action alternative. It is unknown how numerous wolves would be, but this could result in somewhat larger numbers of wolves, which could result in the public experiencing greater numbers of backcountry encounters with wolves. Because Alternative 4 would be less likely to result in the establishment of wolf populations in a Pacific Coast recovery region, backcountry encounters with wolves would most likely occur in eastern Washington and the Cascades. This alternative would maintain

1 outreach and education efforts at current levels, which would limit the amount of  
2 information on wolves that backcountry users would receive.

#### 3 4.2.4. Agricultural Crops - Livestock

4 Wolf reestablishment in Washington is a concern to livestock producers because of the potential for  
5 wolves to kill, injure, or stress cattle, sheep, and other domestic animals. Financial losses may result  
6 directly from wolf depredation whether confirmed or not, and indirect financial losses may  
7 accumulate because of increased management activities or changes to ranching and farming  
8 operations. While impacts might not occur statewide, financial losses could accrue to individual  
9 producers and may be significant to them.

10 *Livestock in Washington.* Estimated inventories of cattle and calves in Washington have remained  
11 relatively stable at about 1.1-1.2 million head (including beef and dairy cattle, and cattle confined to  
12 feedlots) during the past decade (NASS 2004, 2007a). Surveys from 2002, the most recent year for  
13 which full data are available, reveal that cattle inventories per county are generally largest in counties  
14 along the Cascade Mountains and in the Columbia Basin. Washington's sheep industry is far smaller  
15 than its cattle industry, with estimated sheep numbers fluctuating annually between 46,000 and  
16 58,000 head during the past decade (NASS 2007). Sheep inventories were largest in Yakima,  
17 Okanogan, Grant, and Whitman counties in 2002. Other livestock vulnerable to wolf predation  
18 include goats, llamas, and horses, but incidents involving these species are infrequent in other  
19 western states.

20 Many livestock producers in Washington rely entirely on private land for their annual operations,  
21 whereas some depend on a combination of private land and public land grazing leases. In these  
22 latter cases, animals are typically kept on private land during the winter, with most calving and  
23 lambing occurring in late winter or early spring. During the warmer months, livestock are taken to  
24 grazing allotments on public lands, many of which occur in more remote locations with rougher  
25 topography and natural vegetative cover. Livestock are then gathered in the fall, with young shipped  
26 to market and breeding stock returned to private land for the winter.

27 About 3.36 million acres in 1,333 active grazing leases currently exist on public lands in Washington.  
28 The majority of leased acreage occurs on national forest lands, with smaller amounts on lands  
29 owned or managed by the Washington Department of Natural Resources, U.S. Bureau of Land  
30 Management, and WDFW. Overall, grazing occurs on about 24.9% of the lands owned or managed  
31 by these four agencies combined. By far the most leases occur in eastern Washington and are used  
32 by cattle. Average lease size is considerably larger on Forest Service lands (14,109 acres per lease)  
33 than on other agency lands (WDNR, 967 acres per lease or permit range; BLM, 986 acres per lease;  
34 WDFW, 1,761 acres per lease). On Forest Service lands, considerable variation exists in the percent  
35 of land designated as grazing leases within each national forest, ranging from a high of 52.7% in  
36 Colville National Forest to 0% in Mt. Baker-Snoqualmie and Olympic National Forests. Numbers  
37 of active leases on national forests have declined substantially over the past 15 years primarily  
38 because of economic and social reasons (W. Gaines, pers. comm.).

*Wolf Depredation on Livestock.* The recovery of wolves in other states has resulted in depredations on cattle, sheep, and other livestock. However, despite significant increases in wolf populations, confirmed losses to wolves have remained infrequent to date relative to total livestock numbers (Bangs et al. 2005b, USFWS 2008a). Bangs et al. (2006) noted that while wolf depredations on livestock were unimportant to the regional livestock industry, they could affect the economic viability of some ranchers. Many factors influence depredation rates on livestock, including the proximity of livestock to wolf home ranges, dens, and rendezvous sites; pack size; abundance of natural prey and livestock; amount and type of vegetative cover; time of year; livestock husbandry methods in both the area of concern and adjacent areas; the use of harassment tools and lethal take; pasture size; and proximity to roads, dwellings, and other human presence (Mech et al. 2000, Fritts et al. 2003, Treves et al. 2004, Bradley and Pletscher 2005). These factors make it difficult to predict where and when depredations by wolves will occur.

Wolves don't necessarily attack livestock whenever livestock are encountered, but most wolf packs that regularly encounter livestock are likely to depredate at some point (Bangs and Shivik 2001). Some packs show increasingly frequent depredation behavior, while others may do so once or twice a year, every other year, or even less frequently (USFWS et al. 2011). USFWS et al. (2011) reported that on average 10-38% of all wolf packs in Montana were confirmed to have killed livestock in any given year from 1999 to 2010. In comparison, 33-85% of the packs in Wyoming outside of Yellowstone National Park were involved in depredations annually from 2005 to 2010 (USFWS et al. 2011).

In the northern United States, wolf depredation on livestock occurs more frequently from March to October when livestock spend more time under open-grazing conditions, calving is taking place, and wolf litters are being raised (Fritts et al. 2003, Musiani et al. 2005, Sime et al. 2007, Edge et al. 2011). Untended livestock, particularly young calves, appear to be more vulnerable, and the presence of livestock carcasses on a property may increase risk as well (Fritts et al. 2003, Edge et al. 2011). Depredations occur on both open grazing sites and inside fenced pastures. Sime et al. (2007) reported that among the 162 livestock producers suffering confirmed wolf depredation in Montana between 1987 and 2006, 62% experienced a single incident, 20% experienced two incidents, and 17% experienced three or more incidents.

In the northern Rocky Mountain states, calves are more commonly killed than other age groups of cattle because of their greater vulnerability (Fritts et al. 2003; Bangs et al. 2005a; Unsworth et al. 2005; Sime et al. 2007; Stone et al. 2008; J. Timberlake, pers. comm.). Oakleaf et al. (2003) found that wolves tend to choose the smallest calves and there is evidence that some depredated calves are in poorer physical condition (Bradley and Pletscher 2005). In parts of Canada, wolves sometimes kill yearling cattle more often than calves (Stone et al. 2008). In contrast, adult sheep appear to be taken more frequently than lambs (Fritts et al. 2003). Depredations on sheep commonly involve multiple individuals, whereas those on cattle usually involve single animals.

1 In Idaho, Montana, and Wyoming, significant variation in the number of cattle and sheep killed by  
2 wolves occurs among states and sometimes between years. While the numbers of livestock killed by  
3 wolves in these states have generally increased over time as wolf numbers have grown, these are  
4 small compared to losses caused by coyotes, cougars, bobcats, dogs, bears, foxes, eagles, and other  
5 predators (NASS 2005, 2006). Wolf depredations are also far fewer than the number of losses for  
6 the combined non-predator losses (e.g., sickness, disease, weather, and birthing problems) in Idaho,  
7 Montana, and Wyoming.

8 Figures for confirmed depredations caused by wolves represent minimum estimates of the livestock  
9 actually killed by wolves. Probable losses, in which officials are unable to verify the cause of death,  
10 are not included. Additionally, ranchers sometimes fail to locate carcasses or are unable to notify  
11 authorities soon enough to obtain confirmation because of the rugged and vast terrain where  
12 livestock graze, the extent of carcass consumption by predators and scavengers, or carcass  
13 decomposition. In some instances, ranchers may choose not to report their losses.

14 *Methods for Resolving Wolf-Livestock Conflicts.* Managing wolf-livestock conflicts and wolf recovery  
15 requires an integrated approach using a variety of non-lethal and lethal methods. Non-lethal  
16 measures, especially when used in combination, often temporarily succeed in reducing the  
17 vulnerability of livestock to wolf depredation, but are usually not considered permanent solutions by  
18 themselves. These approaches offer a partial alternative to lethal control of wolves and can be  
19 especially important when wolf numbers and distribution are small and recovery objectives have not  
20 yet been achieved. These measures comprise a number of husbandry methods and non-lethal  
21 deterrents to reduce the vulnerability of livestock, including: 1) using range riders to help keep cattle  
22 more concentrated on grazing sites; 2) having herders with dogs present with sheep at night when  
23 most sheep depredation occurs; 3) burying livestock carcasses rather than dumping them in  
24 traditional bone yards to reduce scavenging opportunities for wolves; 4) moving sick or injured  
25 livestock; 5) delaying turnout of cattle onto grazing sites until calving is finished or until young wild  
26 ungulates are born; 6) allowing calves to reach at least 200 pounds before turning them out to  
27 grazing sites (Oakleaf et al. 2003); 7) avoiding grazing livestock near the core areas of wolf  
28 territories, especially dens and rendezvous sites, during the earlier portion of the grazing season; 8)  
29 using guarding animals (primarily dogs) with livestock to alert herders when wolves are nearby; 9)  
30 using light and noise scare devices to frighten wolves away from confined livestock and to alert  
31 ranchers and herders to the presence of wolves; 10) hazing wolves with non-lethal munitions (e.g.,  
32 cracker shells, rubber bullets) to frighten them away and teach them to avoid livestock; 11) using  
33 permanent or temporary predator-resistant or electric fencing to confine livestock; and 12) using  
34 fladry, which consists of numerous strips of flagging hung along a fence or rope, to keep wolves out  
35 of an area occupied by livestock. Implementation of these methods can result in higher costs to  
36 livestock producers.

37 Lethal control of wolves may be necessary to resolve repeated wolf-livestock conflicts and is  
38 performed to remove problem animals that jeopardize public tolerance for overall wolf recovery.  
39 More than 1,500 wolves were killed in control actions in Idaho, Montana, and Wyoming from 1987

1 to 2010, with 7-16% of the population removed annually since 2002. While federally listed, most  
2 lethal control of wolves in these states was performed by wildlife agency staff. As wolves became  
3 more common, the U.S. Fish and Wildlife Service gradually loosened restrictions on lethal control to  
4 allow increased take by agency staff and private citizens with a federal permit (Bangs et al. 2006). In  
5 Idaho, Montana and Wyoming, agency decisions to lethally remove wolves are made on a case-by-  
6 case basis, taking into account specific factors such as a pack's size and conflict history, status and  
7 distribution of natural prey in the area, season, age and class of livestock, success or failure of non-  
8 lethal tools, and potential for future losses (Sime et al. 2007). Where lethal removal is deemed  
9 necessary, incremental control is usually attempted, with one or two offending animals removed  
10 initially. If depredations continue, additional animals may be killed and eventual elimination of an  
11 entire pack may occur (Sime et al. 2007).

12 Lethal control of wolves by agency staff can have the advantages of being swift, effective, and tightly  
13 regulated. The benefits of allowing lethal removal by livestock producers are that 1) offending  
14 wolves are more likely to be targeted, 2) it can eliminate the need for agency control, 3) shooting at  
15 wolves may teach them and other pack members to be more wary of humans and to avoid areas of  
16 high human activity, 4) it allows producers to address their own problems, and 5) it may reduce  
17 animosity toward government management of wolves (Bangs et al. 2006). Drawbacks of lethal  
18 control are that 1) it is controversial among much of the public, 2) depredation may recur, 3) wolves  
19 may respond by becoming more active at night, 4) it can be costly when performed by agencies, 5) it  
20 is open to abuse when conducted by the public, thereby requiring law enforcement follow-up, and 6)  
21 excessive use can preclude the recovery of wolf populations (Musiani et al. 2005, USFWS 2005,  
22 Bangs et al. 2006).

23 *Compensation for Wolf Depredation on Livestock.* Compensation programs have been developed in the  
24 western U.S. and Great Lakes region to help livestock producers recover some of the costs  
25 associated with wolf predation, with the intention that this will build greater tolerance for wolf  
26 recovery. Defenders of Wildlife devised and operated the first compensation program for wolf  
27 depredation in the western United States (Stone 2009). Known as the Bailey Wildlife Foundation  
28 Wolf Compensation Trust, it paid about \$1.5 million to livestock operators in Idaho, Montana, and  
29 Wyoming from 1987 to August 2010 (S. Stone, pers. comm.), with all funding obtained from private  
30 sources. Under this fund, confirmed losses of livestock and herding/guarding dogs were  
31 reimbursed at 100% of their current or projected market value up to \$3,000 per animal, whereas  
32 probable losses were reimbursed at 50% of their current or projected market value up to \$1,500 per  
33 animal. This program ended in all states except Oregon in 2010.

34 Idaho, Montana, and Wyoming have implemented their own state programs to cover standard  
35 losses. Programs in Idaho and Wyoming also cover other types of losses. Idaho compensates for  
36 above-normal mortality as well as lower-than-expected weight gains by livestock. This program also  
37 provides partial reimbursement for proactive efforts. Wyoming uses a multiplier for each confirmed  
38 depredation on calves and sheep to account for undocumented wolf-caused losses. Calves and

1 sheep are compensated up to seven times the number confirmed but only up to the total number  
2 reported missing by a producer.

3 *Impacts of Wolves on Livestock Production in Washington.* The reestablishment of wolves in Washington  
4 will affect some livestock producers through wolf-related depredation and/or changes in husbandry  
5 and management methods needed for adapting to the presence of wolves. Projections of wolf-  
6 caused losses of livestock in the state are described more fully in Chapter 14, Section B, of the  
7 recommended wolf conservation and management plan. During the endangered and threatened  
8 phases of recovery, wolves should pose little detriment to the state's livestock industry as a whole.  
9 At the wolf population levels associated with the early stages of recovery, the vast majority of  
10 producers will probably experience few if any annual costs, whereas a few individual producers  
11 could be more affected. Some of these costs would be offset by compensation from WDFW or  
12 private organizations. As wolf populations become larger and more widely distributed, financial  
13 impacts are likely to accrue to more producers. Where and when depredations occur will depend on  
14 different factors, including the abundance and distribution of wolves and the husbandry methods  
15 and locations of livestock in areas occupied by wolves.

16     ▪ **Alternative 1.** Under this alternative, management of wolf-related conflicts involving  
17 livestock and ungulates would be more aggressive. Non-lethal injurious harassment and  
18 many forms of lethal control by livestock producers would be allowed during earlier stages  
19 of recovery. Some of these actions would likely result in smaller numbers of wolves, which  
20 could result in fewer localized wolf-livestock conflicts. Producers would receive lower  
21 compensation payments for wolf-related livestock depredation under this alternative.  
22 WDFW would also be less available to work with livestock producers in implementing  
23 proactive measures to avoid depredation, which could increase depredation levels and costs  
24 for producers. Wolf-related outreach and education directed at producers would continue at  
25 current levels under this alternative, which would limit the amount of information they  
26 receive about addressing impacts from wolves. Because Alternative 1 would be less likely to  
27 result in the establishment of wolf populations in a Pacific Coast recovery region (as outlined  
28 in Alternative 3), wolf-related impacts to livestock production would be unlikely to occur in  
29 this part of the state.

30     ▪ **Revised Preferred Alternative 2.** Under this alternative, use of lethal control by livestock  
31 owners with a WDFW-issued permit would be allowed on both private and public land for  
32 controlling repeated depredations beginning at sensitive status. "In the act" lethal control of  
33 wolves by livestock owners would be allowed regardless of wolf status, but would require  
34 users to have a WDFW-issued permit, which would be tightly restricted when wolves are  
35 listed as endangered or threatened. Together, these measures would likely result in  
36 somewhat lower levels of wolf mortality related to wolf-livestock conflicts than under  
37 Alternative 1, but perhaps similar or slightly higher levels compared to Alternatives 3 and 4.  
38 Under the revised Preferred Alternative 2, livestock producers would receive generous  
39 compensation for wolf-related livestock depredation, which would be more likely to cover

the actual costs of their losses. WDFW would provide technical assistance to livestock operators to implement proactive measures to reduce conflicts, which would help lower depredation levels and costs for some producers. Wolf-related outreach and education directed at livestock producers would be a high priority and would give producers greater access to information for addressing impacts from wolves. Because the revised Preferred Alternative 2 would be less likely to result in the establishment of wolf populations in a Pacific Coast recovery region (as outlined in Alternative 3), wolf-related impacts to livestock production would be unlikely to occur in this part of the state.

- **Alternative 3.** Management of wolf-related conflicts involving livestock would be less aggressive under Alternative 3. Non-lethal injurious harassment and several types of lethal control by livestock producers would be delayed until later into wolf recovery. This would likely allow larger numbers of wolves to occur in Washington, which could result in greater localized wolf-livestock conflicts. Under Alternative 3, producers would receive the most generous compensation for wolf-related livestock depredation, which would be more likely to cover the actual costs of their losses. WDFW would hire wolf specialists whose duties would include working with livestock producers to implement proactive measures to avoid depredation, which would help lower depredation levels and costs for producers. Wolf-related outreach and education directed at producers would be a high priority under this alternative, which would give producers greater access to information for addressing impacts from wolves. Because Alternative 3 would be more likely to result in the establishment of wolf populations in a Pacific Coast recovery region, wolf-related impacts to livestock producers could occur in that part of the state as well as in other regions.

- **Alternative 4 – No Action (Current Management).** Livestock conflicts would be addressed (as allowed under current federal and state law), but lethal control of wolves would be expected to be less aggressive under this alternative, with all or most lethal control by livestock owners delayed until after delisting. This would likely result in somewhat lower levels of wolf mortality related to wolf-livestock conflicts than under Alternative 1, but perhaps similar or slightly higher levels compared to Alternatives 2 and 3. Livestock producers would receive compensation for wolf-related livestock depredation under this alternative, but it would be under Washington's current program, which would be less than that allowed in Alternatives 2 and 3. Wolf-related outreach and education directed at livestock producers would continue at current levels, which would limit the amount of information that producers receive on addressing impacts from wolves. Under this alternative, WDFW would have fewer staff available to work with livestock producers in implementing proactive measures to avoid depredation, which could increase depredation levels and costs for some producers. Because Alternative 4 would be less likely to result in the establishment of wolf populations in a Pacific Coast recovery region, few if any wolf-related impacts to livestock production would occur in this part of the state.

## 5. Literature Cited

- Akenson, J., H. Akenson, and H. Quigley. 2005. Effects of wolf introduction on a cougar population in the central Idaho wilderness. *Mountain Lion Workshop* 8:177-187.
- Arjo, W. M., D. H. Pletscher, and R. R. Ream. 2002. Dietary overlap between wolves and coyotes in northwestern Montana. *Journal of Mammalogy* 83:754-766.
- Ballard, W. B., L. N. Carbyn, and D. W. Smith. 2003. Wolf interactions with non-prey. Pages 259-271 in L. D. Mech and L. Boitani, editors. *Wolves: behavior, ecology, and conservation*. University of Chicago Press, Chicago, Illinois.
- Bangs, E. E. and J. Shivik. 2001. Managing wolf conflict with livestock in the northwestern United States. *Carnivore Damage Prevention News* No. 3(July):2-5.
- Bangs, E. E., T. N. Bailey, and M. F. Portner. 1989. Survival rates of adult female moose on the Kenai Peninsula, Alaska. *Journal of Wildlife Management* 53:557-563.
- Bangs, E. E., J. A. Fontaine, M. D. Jimenez, T. J. Meier, E. H. Bradley, C. C. Niemeyer, D. W. Smith, C. M. Mack, V. Asher, and J. K. Oakleaf. 2005b. Managing wolf/human conflict in the northwestern United States. Pages 340-356 in R. Woodroffe, S. Thirgood, and A. Rabinowitz, editors. *People and wildlife: coexistence or conflict?* Cambridge University Press, Cambridge, United Kingdom.
- Bangs, E., M. Jimenez, C. Niemeyer, J. Fontaine, M. Collinge, R. Krischke, L. Handegard, J. Shivik, C. Sime, S. Nadeau, C. Mack, D. Smith, V. Asher, and S. Stone. 2006. Non-lethal and lethal tools to manage wolf-livestock conflict in the northwestern United States. *Proceedings of the Vertebrate Pest Conference* 22:7-16.
- Bangs, E., M. Jimenez, C. Niemeyer, T. Meier, V. Asher, J. Fontaine, M. Collinge, L. Handegard, R. Krischke, D. Smith, and C. Mack. 2005a. Livestock guarding dogs and wolves in the northern Rocky Mountains of the United States. *Carnivore Damage Prevention News* 8:32-39.
- Barber-Meyer, S. M., L. D. Mech, and P. J. White. 2008. Elk calf survival and mortality following wolf restoration to Yellowstone National Park. *Wildlife Monographs* 169:1-30.
- Berger, J. and D. W. Smith. 2005. Restoring functionality in Yellowstone with recovering carnivores: gains and uncertainties. Pages 100-109 in J. C. Ray, K. H. Redford, R. S. Steneck, and J. Berger, editors. *Large carnivores and the conservation of biodiversity*. Island Press, Washington, D.C.
- Berger, J., P. B. Stacey, L. Bellis, and M. P. Johnson. 2001. A mammalian predator-prey imbalance: grizzly bear and wolf extinction affect avian neotropical migrants. *Ecological Applications* 11:947-960.
- Berger, K. M. and M. M. Conner. 2008. Recolonizing wolves and mesopredator suppression of coyotes: impacts on pronghorn population dynamics. *Ecological Applications* 18:599-612.
- Berger, K. M. and E. M. Gese. 2007. Does interference competition with wolves limit the distribution and abundance of coyotes? *Journal of Animal Ecology* 76:1075-1085.
- Berger, K. M., E. M. Gese, and J. Berger. 2008. Indirect effects and traditional trophic cascades: a test involving wolves, coyotes, and pronghorn. *Ecology* 89:818-828.
- Beschta, R. L. 2005. Reduced cottonwood recruitment following extirpation of wolves in Yellowstone's Northern Range. *Ecology* 86:391-403.
- Beschta, R. L. and W. J. Ripple. 2008. Wolves, trophic cascades, and rivers in the Olympic National Park, USA. *Ecohydrology* 1:118-130.
- Beschta, R. L. and W. J. Ripple. 2010. Recovering riparian communities with wolves in northern Yellowstone, U.S.A. *Restoration Ecology* 18:380-389.

- Boertje, R. D., M. A. Keech, D. D. Young, K. A. Kellie, and C. T. Seaton. 2009. Managing for elevated yield of moose in interior Alaska. *Journal of Wildlife Management* 73:314-327.
- Boutin, S. 1992. Predation and moose population dynamics: a critique. *Journal of Wildlife Management* 56:116-127.
- Boyd, D., R. Ream, D. Pletscher, and M. Fairchild. 1994. Prey taken by colonizing wolves and hunters in the Glacier National Park area. *Journal of Wildlife Management* 58:289-295.
- Bradley, E. H. and D. H. Pletscher. 2005. Assessing factors related to wolf depredation of cattle in fenced pastures in Montana and Idaho. *Wildlife Society Bulletin* 33:1256-1265.
- Buskirk, S. W. 1999. Mesocarnivores of Yellowstone. Pages 165-187 in T. W. Clark, A. P. Curlee, S. C. Minta, and P. M. Kareiva, editors. *Carnivores in ecosystems: the Yellowstone experience*. Yale University Press, New Haven, Connecticut.
- Carrera, R., W. Ballard, P. Gipson, B. T. Kelly, P. R. Krausman, M. C. Wallace, C. Villalobos, and D. B. Webster. 2008. Comparison of Mexican wolf and coyote diets in Arizona and New Mexico. *Journal of Wildlife Management* 72:376-381.
- Crabtree, R. L., and J. W. Sheldon. 1999. The ecological role of coyotes on Yellowstone's Northern Range. *Yellowstone Science* 7:15-23.
- Creel, S. and J. J. Rotella. 2010. Meta-analysis of relationships between human offtake, total mortality and population dynamics of gray wolves (*Canis lupus*). *PLoS ONE* 5(9):e12918.
- Creel, S. and J. A. Winnie. 2005. Responses of elk herd size to fine-scale spatial and temporal variation in the risk of predation by wolves. *Animal Behavior* 69:1181-1189.
- Creel, S., J. A. Winnie, Jr., and D. Christianson. 2009. Glucocorticoid stress hormones and the effect of predation risk on elk reproduction. *Proceedings of the National Academy of Sciences*. In press.
- DOW (Defenders of Wildlife). 2008. Wildlife conservation solutions. Defenders of Wildlife, Washington, D.C.
- <[http://www.defenders.org/programs\\_and\\_policy/wildlife\\_conservation/solutions/index.php](http://www.defenders.org/programs_and_policy/wildlife_conservation/solutions/index.php)>
- Eberhardt, L. L., P. J. White, R. A. Garrott, and D. B. Houston. 2007. A seventy-year history of trends in Yellowstone's northern elk herd. *Journal of Wildlife Management* 71:594-602.
- Edge, J. L., D. E. Beyer, Jr., J. L. Belant, M. J. Jordan, and B. J. Roell. 2011. Livestock and domestic dog predations by wolves in Michigan. *Human-Wildlife Interactions* 5:66-78.
- Frame, P. F., H. D. Cluff, and D. S. Hik. 2007. Response of wolves to experimental disturbance at homesites. *Journal of Wildlife Management* 71:316-320.
- Fritts, S. H. and L. D. Mech. 1981. Dynamics, movements, and feeding ecology of a newly protected wolf population in northwestern Minnesota. *Wildlife Monographs* 80:1-79.
- Fritts, S. H., R. O. Stephenson, R. D. Hayes, and L. Boitani. 2003. Wolves and humans. Pages 289-316 in L. D. Mech and L. Boitani, editors. *Wolves: behavior, ecology, and conservation*. University of Chicago Press, Chicago, Illinois.
- Griffin, S. C., M. L. Taper, R. Hoffman, and L. S. Mills. 2008. The case of the missing marmots: are metapopulation dynamics or range-wide declines responsible? *Biological Conservation* 141:1293-1309.
- Grooms, S. 2007. Ontario experiences cluster of wolf-human encounters. *International Wolf* 17(3):11-13.
- Hamlin, K. L. and J. A. Cunningham. 2009. Monitoring and assessment of wolf-ungulate interactions and population trends within the Greater Yellowstone Area, southwestern Montana, and Montana statewide, final report. Montana Fish, Wildlife & Parks, Helena, Montana.
- Hebblewhite, M. 2005. Predation by wolves interacts with the North Pacific Oscillation (NPO) on a western North American elk population. *Journal of Animal Ecology*. 74:226-233.

- Hebblewhite, M. and D. W. Smith. 2010. Wolf community ecology: ecosystem effects of recovering wolves in Banff and Yellowstone national parks. Pages 69-120 in M. Musiani, L. Boitani, and P. C. Paquet. The world of wolves: new perspectives on ecology, behavior, and management. University of Calgary Press, Calgary, Alberta.
- Hornocker, M. G. and T. K. Ruth. 1997. Cougar-wolf interaction in the North Fork of the Flathead River, Montana. Hornocker Wildlife Institute, Moscow, Idaho.
- Huggard, D. J. 1993. Prey selectivity of wolves in Banff National Park. I. Prey species. Canadian Journal of Zoology 71:130-139.
- IDFG (Idaho Department of Fish and Game). 2008. Idaho wolf population management plan, 2008-2012. Idaho Department of Fish and Game, Boise, Idaho.  
<<http://fishandgame.idaho.gov/cms/wildlife/wolves/state/PopManagePlan.pdf>>
- IDFG (Idaho Department of Fish and Game). 2010a. Study shows effects of predators on Idaho elk. Idaho Fish and Game News 22(2):1-4.
- Jimenez, M. D., V. J. Asher, C. Bergman, E. E. Bangs, and S. P. Woodruff. 2008. Gray wolves, *Canis lupus*, killed by cougars, *Puma concolor*, and a grizzly bear, *Ursus arctos*, in Montana, Alberta, and Wyoming. Canadian Field-Naturalist 122:76-78.
- Kaufman, M. J., N. Varley, D. W. Smith, D. R. Stahler, D. R. McNulty, and M. S. Boyce. 2007. Landscape heterogeneity shapes predation in a newly restored predator-prey system. Ecology Letters 10:690-700.
- Kauffman, M. J., J. F. Brodie, and E. S. Jules. 2010. Are wolves saving Yellowstone's aspen? A landscape-level test of a behaviorally mediated trophic cascade. Ecology 91:2742-2755.
- Kortello, A. D., T. E. Hurd, and D. L. Murphy. 2007. Interactions between cougars (*Puma concolor*) and gray wolves (*Canis lupus*) in Banff National Park, Alberta. Ecoscience 14:214-222.
- Kunkel, K. and D. H. Pletscher. 1999. Species specific population dynamics of cervids in a multipredator ecosystem. Journal of Wildlife Management 63:1082-1093.
- Kunkel, K. E., D. H. Pletscher, D. K. Boyd, R. R. Ream, and M. W. Fairchild. 2004. Factors correlated with foraging behavior in wolves in and near Glacier National Park, Montana. Journal of Wildlife Management 68:167-178.
- Kunkel, K. E., T. K. Ruth, D. H. Pletscher, and M. G. Hornocker. 1999. Winter prey selection by wolves and cougars in and near Glacier National Park, Montana. Journal of Wildlife Management 63:901-910.
- Larsen, D. G., D. A. Gauthier, and R. L. Markel. 1989. Causes and rate of moose mortality in the southwest Yukon. Journal of Wildlife Management 53:548-557.
- Linnell, J. D. C., R. Anderson, Z. Andersone, L. Balciuskas, J. C. Blanco, L. Boitani, S. Brainderd, U. Breitenmoser, I. Kojola, O. Liberg, J. Loe, H. Okarma, H. C. Pedersen, C. Promberger, H. Sand, E. J. Solberg, H. Valdmann, and P. Wabakken. 2002. The fear of wolves: a review of wolf attacks on humans. NINA Oppdragsmelding 731:1-65.  
<<http://www.nina.no/archive/nina/PppBasePdf/oppdragsmelding/2002/731.pdf>>
- Mao, J. S., M. S. Boyce, D. W. Smith, F. J. Singer, D. J. Vales, J. M. Vore, and E. H. Merrill. 2005. Habitat selection by elk before and after wolf reintroduction in Yellowstone National Park. Journal of Wildlife Management 69:1691-1707.
- McNay, M. E. 2002. Wolf-human interactions in Alaska and Canada: a review of the case history. Wildlife Society Bulletin 30:831-843.
- Mech, L. D. 1970. The wolf: the ecology and behavior of an endangered species. Natural History Press, Garden City, New York.

- 1 Mech, L. D. 2007. Femur-marrow fat of white-tailed deer fawns killed by wolves. *Journal of Wildlife*  
2 *Management* 71:920-923.
- 3 Mech, L. D. and L. Boitani. 2003b. Ecosystem effects of wolves. Pages 158-160 *in* L. D. Mech and  
4 L. Boitani, editors. *Wolves: behavior, ecology, and conservation*. University of Chicago Press,  
5 Chicago, Illinois.
- 6 Mech, L. D. and R. O. Peterson. 2003. Wolf-prey relations. Pages 131-160 *in* L. D. Mech and L.  
7 Boitani, editors. *Wolves: behavior, ecology, and conservation*. University of Chicago Press,  
8 Chicago, Illinois.
- 9 Mech, L. D., E. K. Harper, T. J. Meier, and W. J. Paul. 2000. Assessing factors that may predispose  
10 Minnesota farms to wolf depredation on cattle. *Wildlife Society Bulletin* 28:623-629.
- 11 Merkle, J. A., D. R. Stahler, and D. W. Smith. 2009. Interference competition between gray wolves  
12 and coyotes in Yellowstone National Park. *Canadian Journal of Zoology* 87:56-63.
- 13 Meyers, P. M. 2009. 2009 Columbian white-tailed deer population estimates. U.S. Fish and Wildlife  
14 Service, Julia Butler Hansen Refuge, Cathlamet, Washington.
- 15 MFWP (Montana Fish, Wildlife & Parks). 2007. Wolves and big game in Montana. Montana Fish,  
16 Wildlife & Parks, Helena, Montana. <<http://fwp.mt.gov/wildthings/wolf/gamefaq.html#pop>>
- 17 Mitchell, M. S., D. E. Ausband, C. A. Sime, E. E. Bangs, J. A. Gude, M. D. Jimenez, C. M. Mack, T.  
18 J. Meier, M. S. Nadeau, and D. W. Smith. 2008. Estimation of successful breeding pairs for  
19 wolves in the northern Rocky Mountains, USA. *Journal of Wildlife Management* 72:881-891.
- 20 Murphy, K. 1998. The ecology of the cougar (*Puma concolor*) in the northern Yellowstone ecosystem:  
21 interactions with prey, bears, and humans. Ph.D. Dissertation, University of Idaho, Moscow,  
22 Idaho.
- 23 Musiani, M., T. Muhly, C. C. Gates, C. Callaghan, M. E. Smith, and E. Tosani. 2005. Seasonality and  
24 reoccurrence of depredation and wolf control in western North America. *Wildlife Society*  
25 *Bulletin* 33:876-887.
- 26 NASS (National Agricultural Statistical Service). 2004. 2002 census of agriculture: Washington, state  
27 and county data. Volume 1, Geographic Area Series, Part 47, AC-02-A-47. National  
28 Agricultural Statistics Service, U.S. Department of Agriculture, Washington, D.C.  
29 <<http://www.agcensus.usda.gov/Publications/2002/index.asp>>
- 30 NASS (National Agricultural Statistical Service). 2005. Sheep and goats death loss. National  
31 Agricultural Statistics Service, U.S. Department of Agriculture, Washington, D.C.  
32 <<http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1628>>
- 33 NASS (National Agricultural Statistical Service). 2006. Cattle death loss. National Agricultural  
34 Statistics Service, U.S. Department of Agriculture, Washington, D.C.  
35 <<http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1625>>
- 36 NASS (National Agricultural Statistical Service). 2007. 2007 Washington agricultural bulletin.  
37 Washington Field Office, National Agricultural Statistical Service, U.S. Department of  
38 Agriculture, Olympia, Washington.  
39 <[http://www.nass.usda.gov/Statistics\\_by\\_State/Washington/Publications/Annual\\_Statistical](http://www.nass.usda.gov/Statistics_by_State/Washington/Publications/Annual_Statistical_Bulletin/annual2007.pdf)  
40 [Bulletin/annual2007.pdf](http://www.nass.usda.gov/Statistics_by_State/Washington/Publications/Annual_Statistical_Bulletin/annual2007.pdf)>
- 41 Oakleaf, J. K., C. Mack, and D. L. Murray. 2003. Effects of wolves on livestock calf survival and  
42 movements in central Idaho. *Journal of Wildlife Management* 67:299-306.
- 43 Peterson, R. O., N. J. Thomas, J. M. Thurber, J. A. Vucetich, and T. A. Waite. 1998. Population  
44 limitation and the wolves of Isle Royale. *Journal of Mammalogy* 79:828-841.
- 45 Proffitt, K. M., J. I. Grigg, K. L. Hamlin, and R. A. Garrott. 2009. Contrasting effects of wolves and  
46 human hunters on elk behavioral responses to predation risk. *Journal of Wildlife Management*  
47 73:345-356.

- Rachael, J. 2010. Project W-170-R-33 progress report, elk, Study I, Job 1. Idaho Department of Fish and Game, Boise, Idaho.
- Ripple, W. J. and R. L. Beschta. 2004. Wolves and the ecology of fear: can predation risk structure ecosystems? *BioScience* 54:755-766.
- Ripple, W. J. and R. L. Beschta. 2007. Restoring Yellowstone's aspen with wolves. *Biological Conservation* 138:514-519.
- Rooney, T. P. and D. P. Anderson. 2009. Are wolf-mediated trophic cascades boosting biodiversity in the Great Lakes region? Pages 205-215 in A. P. Wydeven, T. R. Van Deelen, and E. J. Heske, editors. *Recovery of gray wolves in the Great Lakes region of the United States: an endangered species success story*. Springer, New York, New York.
- Sand, H., P. Wabakken, B. Zimmermann, Ö. Johansson, H. C. Pedersen, and O. Liberg. 2008. Summer kills and predation pattern in a wolf-moose system: can we rely on winter estimates? *Oecologia* 156:53-64.
- Scheffer, V. B. 1995. Mammals of the Olympic National Park and vicinity (1949). *Northwest Fauna* 2:5-133.
- Servheen, C. and R. R. Knight. 1993. Possible effects of a restored gray wolf population on grizzly bears in the Greater Yellowstone Area. Pages 28-37 in R. S. Cook, editor. *Ecological issues on reintroducing wolves into Yellowstone National Park*. U.S. National Park Service Scientific Monograph Series NPS/NRYELL/NRSM-93-22.
- Sime, C. A., E. Bangs, E. Bradley, J. E. Steuber, K. Glazier, P. J. Hoover, V. Asher, K. Laudon, M. Ross, and J. Trapp. 2007. Gray wolves and livestock in Montana: a recent history of damage management. *Proceedings of the Wildlife Damage Management Conference* 12:16-35.
- Smith, D. W., T. D. Drummer, K. M. Murphy, D. S. Guernsey, and S. B. Evans. 2004. Winter prey selection and estimation of wolf kill rates in Yellowstone National Park, 1995-2000. *Journal of Wildlife Management* 68:153-166.
- Smith, D. W., R. O. Peterson, and D. B. Houston. 2003. Yellowstone after wolves. *BioScience* 53:330-340.
- Stone, S. A. 2009. Compensation and non-lethal deterrent programs: building tolerance for wolf restoration in the Rockies. Pages 141-158 in M. Musiani, L. Boitani, and P. C. Paquet (editors). *A new era for wolves and people: wolf recovery, human attitudes, and policy*. University of Calgary Press, Calgary, Alberta.
- Stone, S. A., N. Fascione, C. Miller, J. Pissot, G. Schrader, and J. Timberlake. 2008. *Livestock and wolves: a guide to nonlethal tools and methods to reduce conflicts*. Defenders of Wildlife, Washington, D.C.
- Stotyn, S. A., B. N. McLellan, R. Serrouya. 2007. Mortality sources and spatial partitioning among mountain caribou, moose, and wolves in the north Columbia Mountains, British Columbia. Report prepared for the Columbia Basin Fish and Wildlife Compensation Program, Nelson, British Columbia.
- Switalski, T. A. 2003. Coyote foraging ecology and vigilance in response to gray wolf reintroduction in Yellowstone National Park. *Canadian Journal of Zoology* 81:985-993.
- Taylor, W. P. and W. T. Shaw. 1929. Provisional list of the land mammals of Washington. *Occasional Papers of the Charles R. Conner Museum* 2:1-32.
- Tercek, M. T., R. Stottlemeyer, and R. Renkin. 2010. Bottom-up factors influencing riparian willow recovery in Yellowstone National Park. *Western North American Naturalist* 70:387-399.
- Thiel, R. P., S. Merrill, and L. D. Mech. 1998. Tolerance by denning wolves, *Canis lupus*, to human disturbance. *Canadian Field-Naturalist* 112:340-342.

- Thompson, I. D. and R. O. Peterson. 1988. Does wolf predation alone limit the moose population in Pukaskwa Park?: a comment. *Journal of Wildlife Management* 52:556-559.
- Treves, A., L. Naughton-Treves, E. K. Harper, D. J. Mladenoff, R. A. Rose, T. A. Sickley, and A. P. Wydeven. 2004. Predicting human-carnivore conflict: a spatial model derived from 25 years of data on wolf predation on livestock. *Conservation Biology* 18:114-125.
- Unsworth, R., L. Genova, and K. Wallace. 2005. Mexican wolf Blue Range reintroduction project 5-year review: socioeconomic component. Final report, Division of Economics, U.S. Fish and Wildlife Service, Arlington, Virginia.  
<<http://www.fws.gov/southwest/es/mexicanwolf/pdf/MW5YRSocioeconomicsFinal20051231.pdf>>
- USFWS (U.S. Fish and Wildlife Service). 1994. The reintroduction of gray wolves to Yellowstone National Park and Central Idaho. Final Environmental Impact Statement. U.S. Fish and Wildlife Service, Denver, Colorado.
- USFWS (U.S. Fish and Wildlife Service). 2005. Mexican wolf recovery program: progress report #8. U.S. Fish and Wildlife Service, Albuquerque, New Mexico.  
<[http://www.fws.gov/southwest/es/mexicanwolf/pdf/Mexican\\_Wolf\\_Recovery\\_Program\\_Annual\\_Progress\\_Report\\_2005.pdf](http://www.fws.gov/southwest/es/mexicanwolf/pdf/Mexican_Wolf_Recovery_Program_Annual_Progress_Report_2005.pdf)>
- USFWS (U.S. Fish and Wildlife Service). 2008a. Endangered and threatened wildlife and plants; final rule designating the Northern Rocky Mountain population of gray wolf as a distinct population segment and removing this distinct population segment from the federal list of endangered and threatened wildlife. *Federal Register* 73(39):10514-10560.
- USFWS (U.S. Fish and Wildlife Service). 2009. Endangered and threatened wildlife and plants; final rule to identify the Northern Rocky Mountain population of gray wolf as a distinct population segment and to revise the list of endangered and threatened wildlife. *Federal Register* 74(62):15123-15188.
- USFWS (U.S. Fish and Wildlife Service) and USCB (U.S. Census Bureau). 2007. 2006 national survey of fishing, hunting, and wildlife-associated recreation. FHW/06-NAT, U.S. Fish and Wildlife Service, Washington, D.C. <[http://library.fws.gov/nat\\_survey2006\\_final.pdf](http://library.fws.gov/nat_survey2006_final.pdf)>
- USFWS (U.S. Fish and Wildlife Service) and USCB (U.S. Census Bureau). 2008. 2006 national survey of fishing, hunting, and wildlife-associated recreation: Washington. FHW/06-WA, U.S. Fish and Wildlife Service, Washington, D.C.  
<<http://www.census.gov/prod/2008pubs/fhw06-wa.pdf>>
- USFWS (U.S. Fish and Wildlife Service), Nez Perce Tribe, National Park Service, Montana Fish, Wildlife & Parks, Blackfeet Nation, Confederated Salish and Kootenai Tribes, Idaho Fish and Game, and U.S.D.A. Wildlife Services. 2009. Rocky Mountain wolf recovery 2008 interagency annual report. C. A. Sime and E. E. Bangs, editors. U.S. Fish and Wildlife Service, Helena, Montana.
- USFWS (U.S. Fish and Wildlife Service), Montana Fish, Wildlife & Parks, Nez Perce Tribe, National Park Service, Blackfeet Nation, Confederated Salish and Kootenai Tribes, Wind River Tribes, Washington Department of Wildlife, Oregon Department of Wildlife, Utah Department of Natural Resources, and U.S.D.A. Wildlife Services. 2011. Rocky Mountain wolf recovery 2010 interagency annual report. C. A. Sime and E. E. Bangs, editors. U.S. Fish and Wildlife Service, Helena, Montana.
- Van Ballenberghe, V., A. W. Erickson, and D. Byman. 1975. Ecology of the timber wolf in northeastern Minnesota. *Wildlife Monographs* 43:1-43.
- Vucetich, J. A. and R. O. Peterson. 2009. Wolf and moose dynamics on Isle Royale. Pages 35-48 *in* A. P. Wydeven, T. R. Van Deelen, and E. J. Heske, editors. Recovery of gray wolves in the

- 
- 1 Great Lakes region of the United States: an endangered species success story. Springer, New  
2 York, New York.
- 3 WDFW (Washington Department of Fish and Wildlife). 1997-2006. Game harvest reports.  
4 Washington Department of Fish and Wildlife, Olympia, Washington.  
5 <<http://wdfw.wa.gov/hunting/harvest/>>
- 6 WDFW (Washington Department of Fish and Wildlife). 2009. DRAFT Environmental Impact  
7 Statement (EIS) for the Wolf Conservation and Management Plan for Washington.  
8 Washington Department of Fish and Wildlife, Olympia, Washington.
- 9 WGFC (Wyoming Game and Fish Commission). 2008. Final Wyoming gray wolf management plan.  
10 Wyoming Game and Fish Commission, Cheyenne, Wyoming.
- 11 White, P. J., R. A. Garrott, K. L. Hamlin, R. C. Cook, J. G. Cook, and J. A. Cunningham. 2011.  
12 Body condition and pregnancy in northern Yellowstone elk: evidence for predation risk  
13 effects? *Ecological Applications* 21:3-8.
- 14 Wilmers, C. C., R. L. Crabtree, D. W. Smith, K. M. Murphy, and W. M. Getz. 2003a. Trophic  
15 facilitation by introduced top predators: grey wolf subsidies to scavengers in Yellowstone  
16 National Park. *Journal of Animal Ecology* 72:909-916.
- 17 Wilmers, C. C., D. R. Stahler, R. L. Crabtree, D. W. Smith, and W. M. Getz. 2003b. Resource  
18 dispersion and consumer dominance: scavenging at wolf- and hunter-killed carcasses in  
19 Greater Yellowstone, USA. *Ecology Letters* 6:996-1003.
- 20 Wittmer, H. U., B. N. McLellan, D. R. Seip, J. A. Young, T. A. Kinley, G. S. Watts, and D.  
21 Hamilton. 2005. Population dynamics of the endangered mountain ecotype of woodland  
22 caribou (*Rangifer tarandus caribou*) in British Columbia, Canada. *Canadian Journal of Zoology*  
23 83:407-418.

## 6. Personal Communications

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6	Bill Gaines	48	Carolyn Sime
7	Wildlife Biologist	49	Wolf Coordinator
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9	Wenatchee, Washington	51	Helena, Montana
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11	Suzanne Griffin	53	Douglas W. Smith
12	Ph.D. candidate	54	Leader, Yellowstone Wolf Project
13	University of Montana	55	Yellowstone National Park, Wyoming
14	Missoula, Montana	56	
15		57	Suzanne A. Stone
16	Justin Gude	58	Northern Rockies Representative
17	Wildlife Research and Technical Services	59	Defenders of Wildlife
18	Section Manager	60	Boise, Idaho
19	Montana Fish, Wildlife and Parks	61	
20	Helena, Montana	62	Jesse Timberlake
21		63	Northern Rockies Associate
22	Patti Happe	64	Defenders of Wildlife
23	Wildlife Branch Chief	65	Boise, Idaho
24	Olympic National Park	66	
25	Port Angeles, Washington	67	Jim Watson
26		68	Raptor Research Scientist
27	David Mech	69	Washington Department of Fish and Wildlife
28	Senior Research Scientist	70	Concrete, Washington
29	U.S. Geological Survey	71	
30	University of Minnesota	72	
31	St. Paul, Minnesota		
32			
33	Garth Mowat		
34	Senior Wildlife Biologist		
35	B.C. Ministry of Environment,		
36	Kootenay, Region		
37	Nelson, British Columbia		
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39	Steve Nadeau		
40	Wolf Coordinator (former)		
41	Idaho Department of Fish and Game		
42	Boise, Idaho		

## 7. Glossary of Terms

For the purposes of this Draft Environmental Impact Statement, the following definitions apply:

**At-risk ungulate population** – any federal or state listed ungulate population (e.g., Selkirk Mountain woodland caribou, Columbian white-tailed deer), or any ungulate population for which it is determined to have declined 25% or more below management objectives for three or more years and population trend analysis predicts a continued decline. For populations for which numeric estimates and/or management objectives are not currently available, it will not be possible to use a specific threshold to assess a need for management action. Instead WDFW will use other sources of information related to the population, such as harvest trends, hunter effort trends, sex and age ratios, and others.

**Breeding pair** – see Successful Breeding Pair.

**Classify** – to list or delist wildlife species to or from endangered, or to or from the protected wildlife subcategories threatened or sensitive.

**Compensation** – monetary payment to offset or replace the economic loss for a death or injury to livestock or guarding animals due to wolf activity.

**Confirmed wolf depredation** – any depredation where there is reasonable physical evidence that the dead or injured livestock was actually attacked or killed by a wolf. Primary confirmation would ordinarily be the presence of bite marks and associated subcutaneous hemorrhaging and tissue damage, indicating that the attack occurred while the victim was alive, as opposed to simply feeding on an already dead animal. Spacing between canine tooth punctures, feeding pattern on the carcass, fresh tracks, scat, hairs rubbed off on fences or brush, and/or eyewitness accounts of the attack may help identify the specific species or individual responsible for the depredation. Predation might also be confirmed in the absence of bite marks and associated hemorrhaging (i.e., if much of the carcass has already been consumed by the predator or scavengers) if there is other physical evidence to confirm predation on the live animal. This might include blood spilled or sprayed at a nearby attack site or other evidence of an attack or struggle. There may also be nearby remains of other victims for which there is still sufficient evidence to confirm predation, allowing reasonable inference of confirmed predation on an animal that has been largely consumed. Determination will be made by WDFW or other authorized personnel.

**Delist** – to change the classification of endangered, threatened, or sensitive species to a classification other than endangered, threatened, or sensitive.

**Depredation** – any death or injury of livestock, as defined in this plan, caused by a predator.

**Downlist** – to change the classification of an endangered or threatened species to a lower classification (e.g., from endangered to threatened, or from threatened to sensitive).

**Endangered** – as defined by Washington law, any wildlife species native to the state of Washington that is seriously threatened with extinction throughout all or a significant portion of its range within the state.

1 **Extinct** – a wildlife species that no longer exists anywhere; it has died out entirely, leaving no living  
2 representatives.

3  
4 **Fladry** – a method of non-lethal wolf deterrent that involves attaching numerous strips of flagging  
5 material along a fence or other device for the purpose of keeping wolves out of an area occupied by  
6 livestock.

7  
8 **Guarding animals** - any dog, llama, or other species actively used to defend livestock from predators.

9  
10 **Guarding dog** – any dog actively used to defend livestock from predators.

11  
12 **Habituation** – for wolves, this refers to individuals that have lost their natural fear of humans and  
13 human activities, which allows them to live in proximity to humans. This often occurs through repeated  
14 exposure to humans in non-threatening situations, especially where food has been made available.

15  
16 **Herding dog** – any dog actively used to herd livestock.

17  
18 **Hybrid** – the offspring of a mating between a wolf and a dog, a wolf and a hybrid, a dog and a hybrid,  
19 or two hybrids.

20  
21 **In the act of attacking** – actively biting, wounding, or killing.

22  
23 **Lethal control** – management actions that result in the death of a wolf.

24  
25 **List** – to change the classification status of a wildlife species to endangered, threatened, or sensitive.

26  
27 **Livestock** – cattle, calves, pigs, horses, mules, sheep, lambs, llamas, goats, guarding animals, and herding  
28 dogs.

29  
30 **Non-lethal control** – management actions designed to frighten or threaten wolves, but that do not  
31 result in the death of a wolf.

32  
33 **Pack of wolves** – a group of wolves, usually consisting of a male, female, and their offspring from one  
34 or more generations. For purposes of monitoring, a pack is defined as a group of two or more wolves  
35 traveling together in winter.

36  
37 **Proactive management** – non-lethal husbandry methods implemented to minimize the potential for  
38 wolf-livestock conflicts. These may include, for example, modified husbandry methods, light and noise  
39 scare devices, non-lethal munitions, fencing, fladry, guarding animals, and greater use of herders/riders.

40  
41 **Probable wolf depredation** – there is sufficient evidence to suggest that the cause of death was  
42 depredation, but not enough to clearly confirm that the depredation was caused by a wolf. A number of  
43 other factors will help in reaching a conclusion, such as (1) any recently confirmed predation by wolves  
44 in the same or nearby area, and (2) any evidence (e.g., telemetry monitoring data, sightings, howling,  
45 fresh tracks, etc.) to suggest that wolves may have been in the area when the depredation occurred. All  
46 of these factors and possibly others would be considered in the investigator's best professional judgment.  
47 Determination will be made by WDFW or other authorized personnel.

48

1 **Reintroduction** – capturing and moving animals from one area to another, usually for the purpose of  
2 reestablishing a new population in an area that was formerly occupied. For this plan, reintroduction  
3 implies moving wolves from locations outside of Washington to a site(s) inside Washington.  
4

5 **Rendezvous site** – a specific resting and gathering area occupied by wolf packs during summer and  
6 early fall after the natal den has been abandoned. A wolf pack will usually move from the natal den site  
7 to the first rendezvous site when the pups are 6-10 weeks of age (late May-early July). The first  
8 rendezvous site is usually within 1-6 miles of the natal den site. A succession of rendezvous sites are  
9 used by the pack until the pups are mature enough to travel with the adults (usually September or early  
10 October).  
11

12 **Sensitive** – as defined by Washington law, any wildlife species native to the state of Washington that is  
13 vulnerable or declining and is likely to become endangered or threatened in a significant portion of its  
14 range within the state without cooperative management or removal of threats.  
15

16 **Significant portion of its range** – that portion of a species' range likely to be essential to the long-term  
17 survival of the population in Washington.  
18

19 **Source population** – a subpopulation whose reproductive success exceeds mortality and therefore  
20 produces young that emigrate to other subpopulations and unoccupied areas. Source populations are  
21 generally found in better quality habitats known as source habitats.  
22

23 **Species** – as defined by Washington law, any group of animals classified as a species or subspecies as  
24 commonly accepted by the scientific community.  
25

26 **Successful breeding pair** – an adult male and an adult female wolf with at least two pups surviving to  
27 December 31 of a given year, as documented under WDFW's established protocols.  
28

29 **Threatened** – as defined by Washington law, any wildlife species native to the state of Washington that  
30 is likely to become an endangered species within the foreseeable future throughout a significant portion  
31 of its range within the state without cooperative management or removal of threats.  
32

33 **Translocation** – moving animals from one area to another for the purpose of establishing a new  
34 population.  
35

36 **Unknown loss** – with respect to compensation, the loss of livestock from an area with known wolf  
37 activity without a carcass as evidence. This would be based on historical records of livestock return rates  
38 prior to wolf presence/wolf depredation in the area.  
39

40 **Ungulate** – any wild species of hoofed mammal, including deer, elk, moose, bighorn sheep, mountain  
41 goat, and caribou. Cattle, sheep, pigs, horses, and llamas are also ungulates, but are referred to as  
42 domestic livestock in this plan.  
43

44 **Viable population** – one that is able to maintain its size, distribution, and genetic variation over time  
45 without significant intervention requiring human conservation actions.  
46

47 **Wolf recovery/conservation region** – any of three or four broad designated regions in Washington  
48 where wolves need to become reestablished to meet the conservation goals of this plan. The regions are  
49 illustrated in Figures 1 and 2.

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Appendix A. WAC 232-12-297 Endangered, threatened, and sensitive wildlife species classification.

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**WAC 232-12-297 Endangered, threatened, and sensitive wildlife species classification.**

**PURPOSE**

1.1 The purpose of this rule is to identify and classify native wildlife species that have need of protection and/or management to ensure their survival as free-ranging populations in Washington and to define the process by which listing, management, recovery, and delisting of a species can be achieved. These rules are established to ensure that consistent procedures and criteria are followed when classifying wildlife as endangered, or the protected wildlife subcategories threatened or sensitive.

**DEFINITIONS**

For purposes of this rule, the following definitions apply:

2.1 "Classify" and all derivatives means to list or delist wildlife species to or from endangered, or to or from the protected wildlife subcategories threatened or sensitive.

2.2 "List" and all derivatives means to change the classification status of a wildlife species to endangered, threatened, or sensitive.

2.3 "Delist" and its derivatives means to change the classification of endangered, threatened, or sensitive species to a classification other than endangered, threatened, or sensitive.

2.4 "Endangered" means any wildlife species native to the state of Washington that is seriously threatened with extinction throughout all or a significant portion of its range within the state.

2.5 "Threatened" means any wildlife species native to the state of Washington that is likely to become an endangered species within the foreseeable future throughout a significant portion of its range within the state without cooperative management or removal of threats.

2.6 "Sensitive" means any wildlife species native to the state of Washington that is vulnerable or declining and is likely to become endangered or threatened in a significant portion of its range within the state without cooperative management or removal of threats.

2.7 "Species" means any group of animals classified as a species or subspecies as commonly accepted by the scientific community.

2.8 "Native" means any wildlife species naturally occurring in Washington for purposes of breeding, resting, or foraging, excluding introduced species not found historically in this state.

2.9 "Significant portion of its range" means that portion of a species' range likely to be essential to the long term survival of the population in Washington.

**LISTING CRITERIA**

3.1 The commission shall list a wildlife species as endangered, threatened, or sensitive solely on the basis of the biological status of the species being considered, based on the preponderance of scientific data available, except as noted in section.

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Appendix A Continued.

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**WAC 232-12-297 Endangered, threatened, and sensitive wildlife species classification.**

3.2 If a species is listed as endangered or threatened under the federal Endangered Species Act, the agency will recommend to the commission that it be listed as endangered or threatened as specified in section 9.1. If listed, the agency will proceed with development of a recovery plan pursuant to section 11.1.

3.3 Species may be listed as endangered, threatened, or sensitive only when populations are in danger of failing, declining, or are vulnerable, due to factors including but not restricted to limited numbers, disease, predation, exploitation, or habitat loss or change, pursuant to section 7.1.

3.4 Where a species of the class Insecta, based on substantial evidence, is determined to present an unreasonable risk to public health, the commission may make the determination that the species need not be listed as endangered, threatened, or sensitive.

DELISTING CRITERIA

4.1 The commission shall delist a wildlife species from endangered, threatened, or sensitive solely on the basis of the biological status of the species being considered, based on the preponderance of scientific data available.

4.2 A species may be delisted from endangered, threatened, or sensitive only when populations are no longer in danger of failing, declining, are no longer vulnerable, pursuant to section 3.3, or meet recovery plan goals, and when it no longer meets the definitions in sections 2.4, 2.5, or 2.6.

INITIATION OF LISTING PROCESS

5.1 Any one of the following events may initiate the listing process.

5.1.1 The agency determines that a species population may be in danger of failing, declining, or vulnerable, pursuant to section 3.3.

5.1.2 A petition is received at the agency from an interested person. The petition should be addressed to the director. It should set forth specific evidence and scientific data which shows that the species may be failing, declining, or vulnerable, pursuant to section 3.3. Within 60 days, the agency shall either deny the petition, stating the reasons, or initiate the classification process.

5.1.3 An emergency, as defined by the Administrative Procedure Act, chapter 34.05 RCW. The listing of any species previously classified under emergency rule shall be governed by the provisions of this section.

5.1.4 The commission requests the agency review a species of concern.

5.2 Upon initiation of the listing process the agency shall publish a public notice in the Washington Register, and notify those parties who have expressed their interest to the department, announcing the initiation of the classification process and calling for scientific information relevant to the species status report under consideration pursuant to section 7.1.

INITIATION OF DELISTING PROCESS

6.1 Any one of the following events may initiate the delisting process:

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Appendix A Continued.

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**WAC 232-12-297 Endangered, threatened, and sensitive wildlife species classification.**

6.1.1 The agency determines that a species population may no longer be in danger of failing, declining, or vulnerable, pursuant to section 3.3.

6.1.2 The agency receives a petition from an interested person. The petition should be addressed to the director. It should set forth specific evidence and scientific data which shows that the species may no longer be failing, declining, or vulnerable, pursuant to section 3.3. Within 60 days, the agency shall either deny the petition, stating the reasons, or initiate the delisting process.

6.1.3 The commission requests the agency review a species of concern.

6.2 Upon initiation of the delisting process the agency shall publish a public notice in the Washington Register, and notify those parties who have expressed their interest to the department, announcing the initiation of the delisting process and calling for scientific information relevant to the species status report under consideration pursuant to section 7.1.

SPECIES STATUS REVIEW AND AGENCY RECOMMENDATIONS

7.1 Except in an emergency under 5.1.3 above, prior to making a classification recommendation to the commission, the agency shall prepare a preliminary species status report. The report will include a review of information relevant to the species' status in Washington and address factors affecting its status, including those given under section 3.3. The status report shall be reviewed by the public and scientific community. The status report will include, but not be limited to an analysis of:

7.1.1 Historic, current, and future species population trends.

7.1.2 Natural history, including ecological relationships (e.g., food habits, home range, habitat selection patterns).

7.1.3 Historic and current habitat trends.

7.1.4 Population demographics (e.g., survival and mortality rates, reproductive success) and their relationship to long term sustainability.

7.1.5 Historic and current species management activities.

7.2 Except in an emergency under 5.1.3 above, the agency shall prepare recommendations for species classification, based upon scientific data contained in the status report. Documents shall be prepared to determine the environmental consequences of adopting the recommendations pursuant to requirements of the State Environmental Policy Act (SEPA).

7.3 For the purpose of delisting, the status report will include a review of recovery plan goals.

PUBLIC REVIEW

8.1 Except in an emergency under 5.1.3 above, prior to making a recommendation to the commission, the agency shall provide an opportunity for interested parties to submit new scientific data relevant to the status report, classification recommendation, and any SEPA findings.

8.1.1 The agency shall allow at least 90 days for public comment.

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Appendix A Continued.

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**WAC 232-12-297 Endangered, threatened, and sensitive wildlife species classification.**

8.1.2 The agency will hold at least one public meeting in each of its administrative regions during the public review period.

FINAL RECOMMENDATIONS AND COMMISSION ACTION

9.1 After the close of the public comment period, the agency shall complete a final status report and classification recommendation. SEPA documents will be prepared, as necessary, for the final agency recommendation for classification. The classification recommendation will be presented to the commission for action. The final species status report, agency classification recommendation, and SEPA documents will be made available to the public at least 30 days prior to the commission meeting.

9.2 Notice of the proposed commission action will be published at least 30 days prior to the commission meeting.

PERIODIC SPECIES STATUS REVIEW

10.1 The agency shall conduct a review of each endangered, threatened, or sensitive wildlife species at least every five years after the date of its listing. This review shall include an update of the species status report to determine whether the status of the species warrants its current listing status or deserves reclassification.

10.1.1 The agency shall notify any parties who have expressed their interest to the department of the periodic status review. This notice shall occur at least one year prior to end of the five year period required by section 10.1.

10.2 The status of all delisted species shall be reviewed at least once, five years following the date of delisting.

10.3 The department shall evaluate the necessity of changing the classification of the species being reviewed. The agency shall report its findings to the commission at a commission meeting. The agency shall notify the public of its findings at least 30 days prior to presenting the findings to the commission.

10.3.1 If the agency determines that new information suggests that classification of a species should be changed from its present state, the agency shall initiate classification procedures provided for in these rules starting with section 5.1.

10.3.2 If the agency determines that conditions have not changed significantly and that the classification of the species should remain unchanged, the agency shall recommend to the commission that the species being reviewed shall retain its present classification status.

10.4 Nothing in these rules shall be construed to automatically delist a species without formal commission action.

RECOVERY AND MANAGEMENT OF LISTED SPECIES

11.1 The agency shall write a recovery plan for species listed as endangered or threatened. The agency will write a management plan for species listed as sensitive. Recovery and management plans shall address the listing criteria described in sections 3.1 and 3.3, and shall include, but are not limited to:

11.1.1 Target population objectives.

11.1.2 Criteria for reclassification.

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Appendix A Continued.

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**WAC 232-12-297 Endangered, threatened, and sensitive wildlife species classification.**

11.1.3 An implementation plan for reaching population objectives which will promote cooperative management and be sensitive to landowner needs and property rights. The plan will specify resources needed from and impacts to the department, other agencies (including federal, state, and local), tribes, landowners, and other interest groups. The plan shall consider various approaches to meeting recovery objectives including, but not limited to regulation, mitigation, acquisition, incentive, and compensation mechanisms.

11.1.4 Public education needs.

11.1.5 A species monitoring plan, which requires periodic review to allow the incorporation of new information into the status report.

11.2 Preparation of recovery and management plans will be initiated by the agency within one year after the date of listing.

11.2.1 Recovery and management plans for species listed prior to 1990 or during the five years following the adoption of these rules shall be completed within five years after the date of listing or adoption of these rules, whichever comes later. Development of recovery plans for endangered species will receive higher priority than threatened or sensitive species.

11.2.2 Recovery and management plans for species listed after five years following the adoption of these rules shall be completed within three years after the date of listing.

11.2.3 The agency will publish a notice in the Washington Register and notify any parties who have expressed interest to the department interested parties of the initiation of recovery plan development.

11.2.4 If the deadlines defined in sections 11.2.1 and 11.2.2 are not met the department shall notify the public and report the reasons for missing the deadline and the strategy for completing the plan at a commission meeting. The intent of this section is to recognize current department personnel resources are limiting and that development of recovery plans for some of the species may require significant involvement by interests outside of the department, and therefore take longer to complete.

11.3 The agency shall provide an opportunity for interested public to comment on the recovery plan and any SEPA documents.

CLASSIFICATION PROCEDURES REVIEW

12.1 The agency and an ad hoc public group with members representing a broad spectrum of interests, shall meet as needed to accomplish the following:

12.1.1 Monitor the progress of the development of recovery and management plans and status reviews, highlight problems, and make recommendations to the department and other interested parties to improve the effectiveness of these processes.

12.1.2 Review these classification procedures six years after the adoption of these rules and report its findings to the commission.

1 Appendix A Continued.

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2  
3 **WAC 232-12-297 Endangered, threatened, and sensitive wildlife species classification.**

4 AUTHORITY

5 13.1 The commission has the authority to classify wildlife as endangered under RCW 77.12.020. Species classified as  
6 endangered are listed under WAC 232-12-014, as amended.

7 13.2 Threatened and sensitive species shall be classified as subcategories of protected wildlife. The commission has the  
8 authority to classify wildlife as protected under RCW 77.12.020. Species classified as protected are listed under WAC 232-  
9 12-011, as amended. [Statutory Authority: RCW 77.12.020. 90-11-066 (Order 442), § 232-12-297, filed 5/15/90, effective  
10 6/15/90.]

## Appendix B. WDFW Wolf Working Group members.

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Appendix B. Continued.

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Appendix C. Washington Administrative Code 197-11-444 - Elements of the environment.

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## (1) Natural environment

## (a) Earth

- (i) Geology
- (ii) Soils
- (iii) Topography
- (iv) Unique physical features
- (v) Erosion/enlargement of land area (accretion)

## (b) Air

- (i) Air quality
- (ii) Odor
- (iii) Climate

## (c) Water

- (i) Surface water movement/quantity/quality
- (ii) Runoff/absorption
- (iii) Floods
- (iv) Ground water movement/quantity/quality
- (v) Public water supplies

## (d) Plants and animals

- (i) Habitat for and numbers or diversity of species of plants, fish, or other wildlife
- (ii) Unique species
- (iii) Fish or wildlife migration routes

## (e) Energy and natural resources

- (i) Amount required/rate of use/efficiency
- (ii) Source/availability
- (iii) Nonrenewable resources
- (iv) Conservation and renewable resources
- (v) Scenic resources

## (2) Built environment

## (a) Environmental health

- (i) Noise
- (ii) Risk of explosion
- (iii) Releases or potential releases to the environment affecting public health, such as toxic or hazardous materials

## (b) Land and shoreline use

- (i) Relationship to existing land use plans and to estimated population
- (ii) Housing
- (iii) Light and glare
- (iv) Aesthetics
- (v) Recreation
- (vi) Historic and cultural preservation
- (vii) Agricultural crops

## (c) Transportation

- (i) Transportation systems
- (ii) Vehicular traffic
- (iii) Waterborne, rail, and air traffic
- (iv) Parking
- (v) Movement/circulation of people or goods
- (vi) Traffic hazards

## (d) Public services and utilities

- (i) Fire
- (ii) Police
- (iii) Schools
- (iv) Parks or other recreational facilities
- (v) Maintenance
- (vi) Communications
- (vii) Water/storm water
- (viii) Sewer/solid waste
- (ix) Other governmental services or utilities

(3) To simplify the EIS format, reduce paperwork and duplication, improve readability, and focus on the significant issues, some or all of the elements of the environment in WAC [197-11-444](#) may be combined.

[Statutory Authority: RCW [43.21C.110](#). 84-05-020 (Order DE 83-39), § 197-11-444, filed 2/10/84, effective 4/4/84.]

Appendix D. Summary of comments made during seven public scoping meetings in August 2007 and whether they were considered in developing the wolf conservation and management plan alternatives (√) or were outside the scope of the plan.

Comment	Considered in developing the plan alternatives
<b>Conservation</b>	
Establish wolf recovery objectives based on a minimum viable population	√
Ensure viable wolf populations prior to state delisting	√
Establish wolf recovery objectives using best available science	√
Establish wolf recovery objectives based on habitat capacity	√
Establish wolf recovery objectives based on ecosystem health, while protecting livestock	√
Establish recovery objectives based on ecological principles and the restoration of ecosystem function	√
Use the same wolf population numbers for delisting and relisting	√
Include distribution criteria in wolf recovery	√
Recover wolves to historical population numbers	Outside scope of the plan
Return wolves to restore ecosystem function	√
Consider the needs of the Okanogan region when setting wolf recovery objectives	√
Consider breeding pairs, but also consider packs or individuals, in establishing recovery objectives	√
Consider influence of high human population in setting wolf recovery objectives	√
Identify recovery areas based on potential habitat and minimal human conflict	√
Identify suitable wolf habitat statewide in wolf planning process	√
Recognize societal value of wolves in conservation planning	√
Include occupancy of ecoregions in down-listing and delisting criteria; e.g., 50% occupancy of ecoregions for down-listing to threatened and 80% occupancy of ecoregions for delisting	√
Include social and political factors, landownership patterns, and ecoregional targets in establishing recovery objectives	√
Maintain seasonal habitats for wolves in lowland areas	√
Consider ecological benefits of wolves to wildlife when developing recovery objectives	√
Develop wolf management units with population objectives that reflect habitat capacity within units	√
Establish wolf population recovery objectives by ecoregion or region	√
Include an objective for a viable population on the Olympic Peninsula	√
Address limiting factors that have prevented wolves from re-establishing in the state to optimize potential for recovery	√
Address why wolves were originally extirpated from the state	√
Assess the potential for impacts of wolves on other state species of concern and wildlife	√
Address criteria for translocation of wolves within the state	√
Don't allow translocations to occur	√
Translocate depredating wolves	√

Appendix D. Summary of comments made during seven public scoping meetings in August 2007 and whether they were considered in developing the wolf conservation and management plan alternatives (✓) or were outside the scope of the plan.

Comment	Considered in developing the plan alternatives
Maintain genetic diversity in the wolf population	✓
Address the wolf plan's development guideline of prohibiting translocation in national parks	✓
Translocation should be an option in the southern Cascades and Olympic Peninsula due to barriers to natural dispersal	✓
Identify geographic areas where wolves would be protected and areas for translocation, such as Olympic National Park and Gifford Pinchot National Forest	✓
Report the wolf plan "sideboards" and who established them	✓
Reintroduction should be an option at this time	Outside scope of the plan
Address any differences between the current wolf plan and past feasibility study to reintroduce wolves to Olympic National Park	✓
Allow wolves to recover on their own with as little human involvement as possible	✓
If hunting of wolves in Idaho prevents suitable dispersal in Washington, consider the need for reintroductions	✓
Identify and maintain dispersal habitat that would allow movement among wolf occupied areas	✓
Focus on dispersal of wolves for recovery until established	✓
In recovery planning, recognize the long time frame involved in recovery	✓
<b>Hunting</b>	
Manage wolves as a game species	✓
Recover wolf populations so that they may be hunted	✓
If wolves become a game species, do not allow aerial hunting, trapping, use of motorized vehicles, or poisons	✓
When wolves are delisted, designate them as a game species for hunting and allow ranchers to kill wolves depredating livestock	✓
When wolves are delisted, do not designate the wolf as a game species for hunting	✓
Designating the wolf as a game species may result in poaching and other excessive mortality	✓
Control problem wolves with hunting	✓
<b>Ungulate Conflicts</b>	
Evaluate the impacts of wolves on game populations (elk, deer, and caribou). Include increased scientific monitoring to evaluate wolf-related impacts	✓
Evaluate elk-wolf management objectives in game management plans, including triggers to address a wolf management action	✓
Do not allow shortcomings in game management goals and objectives to drive wolf management objectives and goals.	✓
Determine the effect of wolves on hunting opportunity of ungulates	✓
Reduce hunting opportunity in areas where wolves have reduced deer/elk populations to compensate for reduced ungulate numbers	✓
Manage hunting of wolf prey species around livestock areas to minimize potential wolf depredations on local livestock	✓

Appendix D. Summary of comments made during seven public scoping meetings in August 2007 and whether they were considered in developing the wolf conservation and management plan alternatives (✓) or were outside the scope of the plan.

Comment	Considered in developing the plan alternatives
Evaluate whether enhancement of wolf prey populations could reduce wolf depredations on livestock	✓
Evaluate influence and role of big game populations in wolf recovery objectives	✓
Manage wolves so that they do not negatively impact game populations	✓
Recognize the many factors that may affect game populations (e.g. habitat changes) in addition to wolf predation, and recognize the ecological effects of not having wolves in Washington	✓
Recognize the beneficial role of wolves in maintaining healthy deer and elk herds	✓
Identify wolf management actions if wolves occur at elk winter feeding sites or other ungulate concentration areas	✓
Conduct studies to evaluate predator-prey dynamics before and after wolf establishment, including cougar and black bear	✓
Limit hunting of wolf prey species until wolf populations meet recovery objectives	✓
<b>Livestock Conflicts</b>	
Include measures for protection of livestock and pets while wolves are state-listed	✓
Develop guidelines for livestock owners on their response to wolf depredations and evaluate wolf control models from adjacent states	✓
Consider compensation for wolf depredation occurring on private lands, but on public lands, livestock owners should be required to use best management practices to protect livestock, such as use of guard dogs	✓
Given that grazing on public lands is already subsidized, should livestock producers receive additional compensation from the government for wolf depredations?	✓
Identify best management practices for ranchers to prevent/minimize wolf depredations, such as requiring ranchers to properly dispose of livestock carcasses and not locating calving areas near wolf dens	✓
Develop a process for reporting suspected depredations of livestock that is simple and includes a local response involving WDFW	✓
Address public concern of game populations attracting wolves to nearby livestock	✓
Train ranchers in the use of wolf deterrents, subsidize wolf deterrent process, and identify who ranchers contact for wolf deterrents	✓
Provide ranchers with incentives to give up their grazing allotments, such as a buy-out program	✓
Prohibit grazing on public lands if it leads to wolf-livestock conflicts	✓
Federal agencies should identify which federal lands should not allow grazing	✓
Limit livestock grazing on state lands to enhance foraging habitat for wolf prey (e.g., deer and elk)	✓
Manage grazing and vegetation to enhance foraging habitat for wolf prey and identify funding source	✓

Appendix D. Summary of comments made during seven public scoping meetings in August 2007 and whether they were considered in developing the wolf conservation and management plan alternatives (✓) or were outside the scope of the plan.

Comment	Considered in developing the plan alternatives
<b>Compensation</b>	
Consider basing compensation for wolf depredations on degree of active management of livestock to prevent wolf depredations	✓
Consider different compensation levels for livestock depredation on public vs. private lands	✓
Explain why compensation is justified for losses of livestock	✓
Livestock loss on public land needs to be verifiable; also need to consider how to address non-verifiable kills and compare to baseline loss rate	✓
Establish a fund to compensate livestock owners for losses due to depredation, and determine whether compensation is based on current market value or projected market value	✓
Compensation to ranchers should include losses associated with stress, disturbance, weight loss, change in distribution for livestock	✓
<b>Monitoring</b>	
Provide up-to-date information on geographic distribution of wolves for access by the public	✓
Use citizen science volunteers to help monitor wolves	✓
Develop a mechanism for the public to report wolf sightings to WDFW; identify verification criteria, address landowner concerns regarding potential land use restrictions if they report wolf sightings on their property	✓
<b>Management</b>	
Only individual problem wolves should be removed	✓
Address alternatives to lethal control of problem wolves	✓
Identify roles and responsibilities of state and federal agencies in wolf recovery	✓
After delisting, establish criteria for allowing lethal control of wolves if homes, livestock or pets are threatened	✓
Management of human/wolf conflict should only allow lethal control as a last resort	✓
Do not allow bounties on wolves	✓
Lethal control of depredating wolves needs to be acceptable	✓
Only nonlethal control should be used to address livestock depredation, such as use of anti-wolf odors, noises, and fencing	✓
Identify nonlethal incentives for ranchers to address wolf conflicts, including “biological fencing” that uses chemicals to stimulate scent marking to keep wolves away from designated areas	✓
Address the potential for habituation resulting from feeding of wolves	✓
Identify management actions for “nuisance” wolves	✓
Establish guidelines/laws for shooting wolves if personal safety is at risk	✓
Determine if people recreating in the backcountry will be excluded from wolf areas	✓
<b>Education and Outreach</b>	
Engage the public in education and outreach about wolf ecology and behavior	✓
Education outreach to ranchers and farmers is needed; consider using WSU extension agents	✓

Appendix D. Summary of comments made during seven public scoping meetings in August 2007 and whether they were considered in developing the wolf conservation and management plan alternatives (✓) or were outside the scope of the plan.

Comment	Considered in developing the plan alternatives
Education and outreach is needed for the general public on the role of predators in ecosystems, how the public values wolves, and how the public can distinguish a coyote from a wolf	✓
Educate the public on how people should react to a wolf encounter when recreating in wolf areas, include incidence of wolf attacks on humans and pets, and address impacts of wolf viewing	✓
<b>Interagency Cooperation</b>	
Work with other government agencies and tribes to reduce road densities in key wolf areas	✓
Encourage tribal involvement	✓
Establish and maintain cooperation and agreements between natural resource agencies in Washington and British Columbia that promote wolf recovery in Washington, including the issue of trapping and hunting on the border.	✓
<b>Economics</b>	
Develop a market for “wolf friendly” beef	✓
Develop ecotourism and “watchable wildlife” opportunities for wolves to promote economic benefits to communities	✓
Consider the negative influence of wolves on property values	✓
<b>Funding</b>	
Identify funding sources for wolf management, including enforcement, monitoring, wolf depredation, and post-delisting activities	✓
Identify a funding source for non-lethal control measures, such as fencing	✓
When wolves are delisted, consider trophy hunting of wolves as a funding source for wolf monitoring	✓
Secure funding for wolf depredation compensation based on the public sector that benefits from wolves (e.g., tourists)	✓
Evaluate potential funding from tribes	✓
Develop a wolf license plate to provide a funding source for wolf management	✓
Implement a statewide tax to fund nongame wildlife species to help fund wolf management activities	Outside scope of the plan
<b>General</b>	
Update the wolf plan to include best and most recent available science	✓
Consider requiring wolf-dog hybrid breeders to register animals in a DNA database	✓
Evaluate the potential for poaching of wolves	✓
Integrate NGOs into the wolf management process	✓
Evaluate sterilization of wolves to control their population	✓
Evaluate potential for transmission of disease from wolves	✓
Build on the knowledge and experience gained from other states	✓

Appendix E. Comments submitted by three anonymous scientific peer reviewers. More detailed comments by the reviewers are available at: [http://wdfw.wa.gov/conservation/gray\\_wolf/](http://wdfw.wa.gov/conservation/gray_wolf/)



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Date: 26 January 2010  
To: Daniel Vogt, SRC Managing Editor, University of Washington  
From: Todd K. Fuller, Associate Editor, University of Massachusetts, Amherst  
Subject: Synthesis of expert comments on the "Draft Wolf Conservation and Management Plan for Washington"

The following is a synthesis of the Independent Science Panel review of the Draft Wolf Conservation and Management Plan for Washington; also attached are the individual reviews of the experts on which the synthesis is mostly based. Like the individual reviews, this synthesis addresses the basic and focus questions identified by the Washington Department of Fish and Wildlife (WDFW). In doing so, it touches on the summary chapters of the plan, the step-down outline of the various tasks required to conserve and manage wolves in Washington, as well as the two major issues that were identified by the WDFW: (1) conservation/recovery objectives for down-listing and delisting wolves at the state level, and (2) management strategies to reduce and address wolf-livestock conflicts.

Overall, the reviewers and I find the plan to be a thoughtful, wide-ranging document that, in order to lay the groundwork for wolf management in Washington State, anticipates the looming controversies, provides a comprehensive review of the literature, and comes to a compromise recommendation that reflects interpretations, opinions, and values of the advisory group authors. There are many forward-thinking recommendations in the plan, yet there appears to be a good number of shortcomings that need to be addressed. All of us agree that the recommendations of the minority report concerning wolf numbers are insufficient for wolf recovery in the State, but at least 3 of us also believe that the population recommendations in the Draft plan are not biologically defensible and will not ensure the "reestablishment of a self-sustaining population of gray wolves in Washington". This is due largely to the compromise that has been made between biological data with social reality, an assumption that connectivity with viable wolf populations in other jurisdictions will always be maintained, and a lack of a population viability analysis that would more clearly demonstrate the biological necessities involved in such an undertaking. Additionally, there are ambiguously defined terms, assumptions that will need to be verified (and a plan to do so), and perhaps an underestimation of the human resources needed in the future to make wolf recovery and management successful. I believe that these points can be addressed and resulting plan revised such that the chances for success are high.

## Appendix E. Continued.

2

Basic Questions*B1. Are rigorous, transparent and sound research and statistical methods followed?*

Although not original research, the plan is thorough and comprehensive in its coverage of important topic areas, and the syntheses of various data sets and their presentation are sound. Reviewer #1 rightly points out that there are very important concepts, terms, and ideas that are not fully clarified or defined, but should be. These include for example, “self-sustaining population”, “high probability of persistence”, “significant portion of the species’ range”, and “adequate prey for wolves”. In particular, Reviewer #1 notes that it is not clear how assessments of such terms will be accomplished. Providing clarification will certainly help conservation efforts. Reviewer #2 importantly notes that a major analytical method, Population Viability Analysis (PVA), although recognized by the advisory group as a potential tool, was not employed; as a result, biological justification of proposed recovery numbers is inadequate. I agree that these and other identified terms need to be explicitly defined so that results can be measured. Plans to address the acquisition and assessment of these measurements also need to be identified specifically. With respect to the need for a better biological justification of minimum numbers, I agree that a PVA, as speculative as it might be, is worthwhile exercise. More importantly, a reorientation of approach seems necessary here; once a biologically derived minimum is established (by whatever acceptable scientific means), by definition it cannot be compromised by social considerations with a subsequent expectation of success.

*B2. Is there sufficient detail in the document to reproduce the study?*

The structure of the plan, and in particular the topics identified as important to wolf recovery, could certainly be reproduced. Some ambiguities are noted, but in any such endeavor, even with the review the document has received so far, these are to be expected.

*B3. Were data reasonably interpreted?*

All reviewers agree that the data used were reasonably interpreted. Reviewer #3 notes that additional information from outside of the western wolf range, if included, may have influenced some interpretations. I agree that there are insights to be gained from other areas where wolf recovery has occurred or is well along, despite some circumstantial differences. For some places, summaries and retrospectives on their recovery processes, management techniques, and solutions to social problems are available; these can provide alternative views and insights that may be worthwhile to consider.

*B4. Do the stated conclusions logically flow from the results?*

In general, the conclusions do logically flow from the results presented. However, Reviewer #2 points out that by not including a PVA, a major biological perspective was not included or considered, and thus conclusions about population adequacy may not be appropriate. I agree that having this additional analysis would be useful and help make a more complete plan.

## Appendix E. Continued.

3

*B5. Do the literature citations include the latest applicable information and represent the current state of scientific understanding on this topic?*

The literature, though sometimes focused on western wolf recovery efforts and not including use of PVAs or some additional perspectives on wolf management and conservation, is thorough and very useful.

*B6. Are uncertainties and limitations of the work stated and described adequately?*

Many of the uncertainties and limitations of the work, particular where conclusions go beyond existing data, are well presented. Reviewers, however, each identified important areas of uncertainty that should be more clearly addressed. Reviewer #1 sees the issue of maintaining corridors and connectivity, both within the State and with other states or Provinces, is not adequately addressed. In addition, the stated recovery goal of 15 successful breeding pairs is poorly justified biologically because it is a socially accepted compromise. Reviewer #2 rightly believes that “the specific and crucially important context that this plan is a compromise between what wolves need and what people desire is not explicit”, but should be. The concern of Reviewer #3 is that large core habitat, such as is available for wolves in adjacent western states where recovery is occurring, is not available to the same extent and the consequences of this difference perhaps could use more scrutiny. Each of these concerns is well-founded and should be more completely addressed in the plan.

*B7. Are assumptions stated and described adequately?*

All of us agree that many assumptions are well-stated and adequately described, and that many of these are based on models of wolf recovery in other western states. Some assumptions may not be fully justified because they don’t take into account auxiliary data from other areas (Reviewer #3). Some assumptions are adequately described, but plans needed to confirm them have not been made and should be (Reviewer #1). Finally, Reviewer #2 sees a seemingly unstated assumption that the advisory group was “a representative sounding board for crafting a conservation and management plan.” Though there may appear to be some bias with regard to proportional stakeholder participation, I would be as concerned that the group was thought to have provided maximum expert scientific consideration with regard to the biological needs of recovery.

*B8. Is the information presented in an accurate, clear, complete, and unbiased manner and in a proper context?*

All of us agree that the information is presented in an openly honest, clear, and sincere manner. The report is well organized, clearly written, and unbiased, and was a major task that was well done.

## Appendix E. Continued.

4

Focus Questions

*F1. The conservation/recovery objectives to achieve a recovered, self-sustaining wolf population "...in a significant portion of its range" in Washington (state law, WAC 232.12.297), including numbers, duration and geographic extent.*

Reviewer #3 believes that the objectives seem reasonable, but suggests an alternative to counting "successful breeding packs", mainly for logistical reasons. I, along with Reviewers # 1 and # 2, believe that the compromise minimum numbers proposed are inadequate to assure success, especially in light of the lack of a scientific, quantitative assessment of this number and their proposed distribution, an assumption of internal connectivity that may be tenuous, and an assumption on reliance of jurisdictions outside of the state for sustainability (and thus, not "self-sustaining"). Reviewer #1 identifies a number of terms and processes that need definition and clearer delineation of assignment, respectively. These relate to sustainability, distribution aspirations, balancing conservation needs and public desires, negative impacts on recovery or long-term perpetuation, connectivity and genetic diversity, pack sizes, wolf ranges and density, future management, and proposed translocations. Reviewer #2 emphasizes that the biological justification of minimum numbers is not well-justified or documented (e.g., no PVA), and that a justified biological minimum should not be reduced for social/public acceptance reasons; otherwise, the purpose of the conservation action is compromised and its chances of success minimized. Clearly, minimum population sizes required for delisting have been at the heart of many wolf recovery controversies, and it is key that the most thorough analysis for Washington be conducted and vetted ahead of time to avoid costly problems in the future.

*F2. Assessments and recommendations regarding risks to wolf recovery associated with planned management strategies to address livestock conflicts.*

All agree that this section is well-researched and clearly presented. Additional considerations and options that should be discussed include: Reviewer #1 – additional compensation revenue options, reproduction interference as a non-lethal control action, and timing of depredation response and education; Reviewer #2 – alternatives to federal agency responsibility for lethal control; and Reviewer #3 – regulatory limitations on lethal control.

*F3. An evaluation or assessment of the recovery and management strategies proposed in the minority report (Appendix D) and the preferred alternative draft plan as they relate to the likelihood of achieving recovery.*

None of us believe that the recovery numbers proposed in Appendix D have much likelihood of achieving recovery.

*F4. The discussion on potential effects of wolves on ungulate populations in Washington and anticipated depredation levels of domestic livestock.*

This section of the plan is also well researched and clearly presented. It recognizes realistic scenarios regarding wolf effects on ungulates and domestic livestock. Reviewer

Appendix E. Continued.

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#1 emphasizes, as do I, the need to judiciously assess sources-specific changes ungulate populations, to address many stakeholder concerns in some circumstances, and to consider the research opportunities/needs with regards to such interactions. Reviewer #2 has concerns about the role of artificial winter feeding of elk, seemingly in the context of recovering populations of wolves that will interact “naturally” in intact ecosystems. If some circumstances are not very natural (like winter feeding of ungulates), then any expectation by the public that wolf-ungulate interactions might not need as much hands-on management should be lowered.

Additional comments/other issues

Within the appended reports of the expert reviewers, a variety of additional useful questions, thoughts and recommendations are outlined. These are all respectful, helpful, and worthy of consideration. In particular, ongoing, accelerated interactions with the growing wolf population in Washington will require an emphasis on public education. More technical assistance in actually carrying out the recovery objectives should be beneficial. Having available the services of a scientific review panel (including biologists, economists, and social scientists) could greatly help public and managerial confidence. The management of wolves after delisting will benefit from ongoing initiation of such activities on adjacent states, but can also benefit from reviews of post-recovery management elsewhere.

Appendix E. Continued.

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Date: 1 March 2010  
To: Daniel Vogt, SRC Managing Editor, University of Washington  
From: Todd K. Fuller, Associate Editor, University of Massachusetts, Amherst  
Subject: Clarification of reviews of the "Draft Wolf Conservation and Management Plan for Washington" for WDFW.

Original questions for reviewers and Associate Editor are listed at the end of this document.

I have received responses back from all reviewers and these, along with my own response to the five questions submitted by WDFW, are as follows:

1. *Regarding the adequacy of the minority report (Appendix D), the Associate Editor states on page 4 of the summary comments that none of the reviewers or the editor believes that the recovery numbers proposed in Appendix D "have much likelihood of achieving recovery". However, in the comments of each of the reviewers, they indicated that the numbers recommended in Appendix D would not lead to a recovered wolf population as defined under Washington law. We are wondering if the editor might reevaluate his summary of the reviewer statements or explain the difference between his summary and the reviewer statements.*

In response to original question F3, the Reviewers wrote as follows:

- R1 – "...the recovery objective and strategy outlined in the minority report will not achieve recovery in the state of WA."  
R2 – "No. This appendix is a plan for continued persecution of the wolf.  
It has no biological basis....."  
R3 – "The levels of wolves recommended in the minority report does not appear to be a wolf population level that would produce a self-sustaining, viable population of wolves and not likely to spread geographically across major portions of the state...."

I initially stated in the overview that "all of us agree that the recommendations of the minority report concerning wolf numbers are insufficient for wolf recovery in the State...."; as well as stating that "None of us believe that the .....numbers...have much likelihood of achieving recovery." Two of the three reviewers state definitively that the Appendix D plan will not result in recovery of wolves in Washington, and the other hedges a bit by using the phrases "does not appear" and "not likely". I believe that the recovery and management strategies outlined in Appendix D will not achieve wolf recovery in Washington.

2. *Reviewer 1 states on page 10 that sterilization has been shown to reduce coyote predation on domestic sheep and pronghorn fawns and to reduce wolf predation on native ungulates in the Yukon. Could Reviewer 1 provide us the citations for this documentation?*

## Appendix E. Continued.

2

**Below are the requested references:**

Bromley, C., and E. M. Gese. 2001. Effects of sterilization on territory fidelity and maintenance, pair bonds, and survival rates of free-ranging coyotes. *Canadian Journal of Zoology* 79:386-392.

Bromley, C., and E. M. Gese. 2001. Surgical sterilization as a method of reducing coyote predation on domestic sheep. *Journal of Wildlife Management* 65:510-519.

Seidler, R. 2009. Surgical sterilization of coyotes to reduce predation on pronghorn fawns. M.S. degree, Utah State University, Logan, Utah.

Spence, C. E., J. E. Kenyon, D. R. Smith, R. D. Hayes, and A. M. Baer. 1999. Surgical sterilization of free-ranging wolves. *Canadian Veterinary Journal* 40:118-121.

Hayes, R. D., R. Farnell, R. M. P. Ward, J. Carey, M. Dehn, G. W. Kuzyk, Al. M. Baer, C. L. Gardner and M. O'Donoghue. 2003. Experimental reduction of wolves in the Yukon: ungulate responses and management implications. *Wildlife Monographs* 152:1-35.

Apparently publications on the reduced rate of predation on caribou by sterile wolves are not out yet, but are implied in the Hayes monograph.

They were quoted in a newspaper article that they did have reduced predation by sterile wolves, but no scientific publications could be found in my search. They may wish to contact Bob Hayes and see if a report is available.

3. *Reviewer 2 states on page 6 that "safe habitat" for ungulates can perhaps be developed to reduce the hunting success of wolves. We are not familiar with this type of management for wolf-ungulate interactions and are wondering if the reviewer could expand on this topic for us. Has this been done successfully or even attempted elsewhere? Are there any documents that we could refer to or other people to contact for more information on this subject?*

I based that comment loosely on the work in the recent Foraging Ecology book (Foraging : Behavior and Ecology; edited by Stephens, Brown, and Ydenberg, 2007, U. Chicago Press) that provides several chapters on the direct, and especially indirect effects of predators on their prey. Safe habitat could be places where ungulates have high visibility, abundant browse/graze so they need to forage less, or easy access to escape terrain/cover. I don't know if the sort of places on the landscape where wolves are less efficient hunters is generally available, but given the extensive studies of wolves I would be surprised if Mech or Smith haven't characterized the landscapes of kill sites and compared them with places where kills are not made. In fact I am heading to Yellowstone in a few weeks to make some of those measurements around wolf kills there just as a class project.

I would suggest that the managers in Washington contact other wolf researchers to determine if there are characteristics of the landscape that appear to be difficult for wolves to hunt

## Appendix E. Continued.

3

within, and then perhaps these areas could be identified in Washington and given special consideration as places to build ungulate populations.

4. Reviewer 3 provides an alternative scenario for the objectives of the draft plan on page 6. We would like to have this clarified so that we are completely sure of the reviewer's intent. Under state downlisting from endangered to threatened, for example, is the reviewer saying that a population of 100+ wolves for 3 years AND 2 breeding pairs of 4+ wolves in each of the three recovery regions are needed for this downlisting target?

The number was intended to be a statewide numerical goal, and the breeding pack distribution was intended to be a distributional goal. Thus in the below scenario the statewide count would be at least 100 wolves that consisted of 2 or > breeding packs in each of the 3 listed regions.

For 1. state downlisting from endangered to threatened, 100+ wolves for 3 yrs.

- \* 2 breeding packs of 4+ wolves in E. Wash.
- \* 2 breeding packs of 4+ wolves in N. Casc.
- \* 2 breeding packs of 4+ wolves in S. Casc./ NW Coast

5. Reviewer 3 provides comments about fisher-wolf interactions in Minnesota, Wisconsin, and Michigan on page 6. Could the reviewer provide us with sources (either published accounts or people to contact) for (1) the killing of a fisher by a wolf in Wisconsin, and (2) the decline in fisher numbers in the portions of these states occupied by wolves but not elsewhere?

Distribution maps and population trends in fisher & wolves in WI.

Dhuey, B. and J. Olson. 2009. Fisher harvest. Wisconsin Wildlife Surveys. 19(5): 83-89  
<http://www.dnr.state.wi.us/org/land/wildlife/harvest/reports/08fisherharv.pdf>

Rolley, R.E. and M. L. Worland. 2009. Fisher population analysis. Wisconsin Wildlife Surveys. 19(5): 100-103  
<http://www.dnr.state.wi.us/org/land/wildlife/harvest/reports/09fisherpop.pdf>

Wydeven, A.P. and J.E. Wiedenhoft. 2009. Gray wolf population 2008-2009. Wisconsin Wildlife Surveys. 19(5): 141-160  
<http://www.dnr.state.wi.us/org/land/wildlife/harvest/reports/09graywolfpop.pdf>

Report of fisher killed by wolves from a colleague:

"I can't remember if I told you previously about my observations or not so will relay them here in case they are of interest. In 1993 I found a coyote and (later that same summer) a fisher that apparently were killed by wolves in the Truck Trail Pack territory. In both cases the carcasses were left in the middle of gravel roads and were surrounded by many wolf tracks. They had been bitten several times but were not consumed at all. These were the only such occurrences I observed during the 8 years I worked on the US Hwy 53 project."

Appendix E. Continued.

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Let me know if additional information is requested. Many thanks for your help.

Best regards,

Todd

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Appendix E. Continued.

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5

Original Questions for ReviewBasic Questions

- B1. Are rigorous, transparent and sound research and statistical methods followed?*
- B2. Is there sufficient detail in the document to reproduce the study?*
- B3. Were data reasonably interpreted?*
- B4. Do the stated conclusions logically flow from the results?*
- B5. Do the literature citations include the latest applicable information and represent the current state of scientific understanding on this topic?*
- B6. Are uncertainties and limitations of the work stated and described adequately?*
- B7. Are assumptions stated and described adequately?*
- B8. Is the information presented in an accurate, clear, complete, and unbiased manner and in a proper context?*

Focus Questions

- F1. The conservation/recovery objectives to achieve a recovered, self-sustaining wolf population "... in a significant portion of its range" in Washington (state law, WAC 232.12.297), including numbers, duration and geographic extent.*
- F2. Assessments and recommendations regarding risks to wolf recovery associated with planned management strategies to address livestock conflicts.*
- F3. An evaluation or assessment of the recovery and management strategies proposed in the minority report (Appendix D) and the preferred alternative draft plan as they relate to the likelihood of achieving recovery.*
- F4. The discussion on potential effects of wolves on ungulate populations in Washington and anticipated depredation levels of domestic livestock.*

Appendix F. WDFW responses to public and scientific peer review comments on the Draft EIS/Wolf Conservation and Management Plan for Washington. The complete public comments on the Draft EIS can be viewed at: [http://wdfw.wa.gov/conservation/gray\\_wolf/comments.html](http://wdfw.wa.gov/conservation/gray_wolf/comments.html).

Comment	Response
<b>General – support/oppose recovery</b>	
I oppose recovery of any wolves in the state.	Comment noted.
I oppose recovery of wolves in western Washington, including the Olympic Peninsula.	Comment noted.
I oppose wolf recovery because compensation of depredation will never be fully funded.	Comment noted. The Final Recommended Plan notes that WDFW will seek funding for the compensation program.
I support/strongly support wolf recovery in WA.	Comment noted.
I support wolf recovery and value wolves being present in the ecosystem. Wolves are an important symbol of wildness in the west..	Comment noted.
Based on Chapter 2, Section E, of the plan, it is clear that the majority of people in Washington support wolf recovery. Please listen to them.	Comment noted.
I can tolerate the presence of some wolves in Washington as long as they disperse here naturally.	Comment noted.
I believe that all wolves in the state should be eliminated or captured and returned to Canada, Idaho, or Alaska.	Comment noted.
We live in a nation of laws and WDFW is mandated to recover listed species, including wolves, to viable populations.	Comment noted.
Washington is a richer place to live by having wolves present.	Comment noted.
All life forms should be preserved. Wolf recovery will restore a predator that's been missing from our ecosystem for decades.	Comment noted.
As a species native to Washington, wolves deserve to be recovered in this state.	Comment noted.
I want to see wolf recovery occur for the benefit of my children and grandchildren.	Comment noted.
Wolves are one of God's creatures too, just like cattle, sheep, deer, and elk.	Comment noted.
Wolves have a right to survive and should be left alone.	Comment noted.
People should learn to live with wolves in their native habitat.	Comment noted.
Species have been going extinct forever and will continue to do so.	Comment noted.
Wolf recovery will result in pain and suffering to wolves because they will to be killed to minimize conflicts with livestock, ungulates, and humans.	Comment noted.
I never want to see wolves removed from the endangered species list.	Comment noted. The purpose of the wolf conservation and management plan is to develop recovery objectives and strategies that, when implemented, result in eventual recovery of healthy, self-sustaining populations so they can be removed from the state's list of endangered and threatened species.

Comment	Response
Bounties should be reinstituted so that no wolves are able to resettle in Washington.	Comment noted.
Many people I know (including many hunters) are advocating "Shoot, shovel, and shut up."	Comment noted.
Oppose recovery of any wolves in the state until a plan can be devised to keep wolf numbers in check with sustainable game populations.	The plan seeks to balance wolf recovery with maintaining healthy ungulate populations. Goals of the plan are to restore a self-sustaining wolf population while maintaining healthy ungulate populations and hunter opportunities. The Final Recommended Plan added additional provisions for addressing "at risk" ungulate populations if wolf predation were determined to be a primary limiting factor.
Although I support wolves, I oppose recovering them in Washington if it means that large numbers will be controlled to reduce conflicts.	Comment noted. It is not possible to predict the number of wolves that might become involved in conflicts and where lethal control would be used to address the conflict. However, the plan notes that control should not jeopardize recovery. It prioritizes that non-lethal means be used first, especially in the early stages of recovery, and that lethal control be used as a last resort if all other efforts to reduce conflicts have not been effective.
WDFW should look at the problems created by wolves in Idaho, Montana, and Wyoming. I do not want to see these same problems in Washington.	The plan presents data from other states, including Idaho, Montana, Wyoming, Wisconsin, Minnesota, and Michigan, in several chapters.
We do not need another large predator of wild ungulates and livestock in Washington. Washington already has too many predators. We don't need wolves added to the mix.	Comment noted.
People who support wolf recovery either live in cities or are environmentalists, and none of them will be affected by wolves. They would not be so supportive of wolf recovery if they had wolves living near their homes and ranches like rural residents will.	Information on levels of public support for and opposition to wolf recovery is included in Chapter 2, Section E. This information indicates that even the majority of rural residents in Washington surveyed in 2008 and 2009 supported wolf recovery.
Concern that wolves will turn to livestock, pets, or people after reducing or eliminating wild game populations.	There is no evidence from Idaho, Montana, and Wyoming of increased wolf attacks on livestock, pets, or people in areas of known ungulate decline, thus this scenario would very likely never occur in Washington. Wolves would instead be expected to decline in number (through territorial disputes or emigration) in areas without adequate wild prey rather than switch to alternative food sources. Wolves can be a contributing factor in the decline of some ungulate populations in combination with other factors such as loss and deterioration of ungulate habitat, adverse weather, overharvest, and increases in other predators (see Chapter 5, Sections A and B), but have never been shown to eliminate a wild game population. Under the wolf plan, wolves that prey on livestock and pets will be managed immediately using both non-lethal and lethal methods to reduce the occurrence of further conflict. Managers will examine possible non-lethal solutions first for resolving wolf threats to human safety, however, any serious wolf threat to public safety will be managed with lethal control.
I do not believe WDFW will be able to manage the wolf population or damage caused by wolves in the state any better than the agency manages declining salmon and game populations. Does the agency think it can properly manage an additional	Management activities are prioritized using existing resources and efforts are made to secure additional funding for new activities as they arise. The wolf is returning to Washington on its own and will be a part of ongoing management activities for WDFW. The plan outlines strategies for securing additional funding and a

Comment	Response
species, in this case wolves, given the current management load?	prioritization of the most important activities in the plan for implementation in the first six years of the plan.
The wolves that the U.S. Fish and Wildlife Service reintroduced to Yellowstone and Idaho originated from Canada. This subspecies is not native to Washington and should not be allowed to recover in this state. We do not need another non-native species in Washington.	The belief that the wolves reintroduced in the mid-1990s to Idaho and Yellowstone National Park from west-central Alberta and east-central British Columbia differed (being larger and more aggressive) from the wolves that originally occurred in the northern Rocky Mountain states is erroneous for several reasons. First, wolves from the Canadian and northern U.S. Rockies, interior British Columbia, Northwest Territories, and nearly all of Alaska are closely related and belong to a single subspecies known as <i>Canis lupus occidentalis</i> . This conclusion is based on the examination of historical and recent wolf specimens collected throughout North America. Those originating from the region described above have proven to be genetically and morphologically similar. Examples of this are seen in the wolves harvested during the 2009 hunting seasons in Montana and Idaho. Adults from Montana weighed an average of 97 lbs with a maximum of 117 lbs, whereas adults from Idaho weighed an average of 101 lbs with a maximum of about 130 lbs. These weights are similar to the sizes of the wolves that occurred in these states in the 1800s and early 1900s. Second, wolves are well known for their ability to disperse long distances from their birth sites. Radio-tracking data show that wolves from southeastern British Columbia and southwestern Alberta mix both with wolves from Idaho and Montana, and with wolves from farther north near the source locations of the animals used in the Idaho and Yellowstone reintroductions. When combined with recent genetic research that reveals considerable genetic mixing among wolf populations in Idaho, Montana, and Wyoming, this information shows that wolves form a single population across the Rocky Mountains of the northern U.S. and southern Canada. Third, recent genetic research involving hundreds of wolves sampled from Idaho, Montana, and Wyoming in the 1990s and 2000s found no evidence of a remnant native population of wolves that differed from the reintroduced wolves. Thus, the wolves present in these states before wolf recovery began were genetically similar to those used in the reintroductions.
I will not stand by and watch wolves kill my livestock and pets.	Comment noted.
It seems that WDFW and its wolf plan are forcing the recovery of wolves onto the citizens of Washington.	Wolves are native to Washington, and are naturally dispersing back into Washington and establishing resident packs. The purpose of the plan is to fulfill the legal requirement to develop a recovery plan for the species, and to have a plan in place for managing the species as it returns to the state on its own.
The public (and WDFW) does not have a responsibility to recover wolves in the state.	WDFW has a mandate to preserve, protect, and perpetuate the native wildlife species of the state.
We have more to lose than gain by wolf recovery.	Comment noted.
Ninety percent of the people living in Ferry, Stevens, and Pend Oreille counties oppose wolf recovery.	There is a wide range of values regarding wolf recovery among Washington citizens. Surveys conducted in 2008 and 2009 found moderate to strong support for wolf recovery among the majority of Washington residents, including rural residents (see Chapter 2, Section E).
The plan is WDFW's response to an unfunded mandate of the federal Endangered Species Act to translocate wolves to most parts of Washington.	There is no federal recovery plan for wolves in Washington and no federal proposal to move wolves into the state. The development of a state wolf plan is not related to the federal ESA;

Comment	Response
	<p>it is in response to state recognition that wolves are returning to Washington on their own and that we need a plan for how the state will manage them. Because they are a state listed species, a recovery plan is needed. There are no reintroductions planned for Washington, and one of the sideboards of the plan was that there would be no reintroductions of wolves into Washington from other states or provinces. It is unnecessary because wolves are dispersing into Washington on their own from populations in adjacent states and provinces.</p> <p>WDFW is required by state law to develop a recovery plan for state- listed species (WAC 232-12-297). With regard to funding, the majority of wolf work being done by WDFW is funded by federal grants.</p>
People wishing to have wolves in Washington should move to another state where they already exist.	Comment noted.
WDFW is the most hated state agency in Stevens County. WDFW should leave wolf management in Stevens County up to county residents only.	Comment noted.
I am convinced that wolf recovery is the primary objective of anti-hunters, liberals, bureaucrats, and the anti-gun crowd, whose goal is to balance nature without hunting and to breakdown the livestock industry.	<p>The livestock industry and hunting are vital components of Washington's economy. Ranching also provides important open space and habitats that support a wide variety of wildlife, including deer and elk. WDFW receives a significant amount of its revenue through the sale of hunting licenses, thus it is illogical to think that the agency is to trying end hunting. The main reason that WDFW convened a Wolf Working Group was to solicit advice from ranchers, hunters, conservationists, and others on writing a balanced wolf plan that achieves recovery while limiting conflicts.</p>
Wolf recovery will result in many adverse effects. It is naive to believe that wolves can be recovered in the state without causing hardship to people.	<p>The plan acknowledges that some people will experience adverse effects as a result of wolf recovery in the state. The plan identifies actions to minimize these impacts using a variety of tools, including compensation for livestock depredations, use of methods to minimize and prevent livestock-wolf conflicts (both non-lethal and lethal measures), and methods to address wolf-ungulate interactions.</p>
Wolves only belong in a zoo.	Comment noted.
Support protecting wolves in Washington's national parks, managing them as a big game species on national forest lands, and considering them a predator/varmint on private lands where they can be shot on sight. This is similar to Wyoming's treatment of wolves.	<p>Wolves are listed as an endangered species throughout Washington, and would be managed consistently. The approach described (similar to Wyoming) would not be expected to result in recovery of wolves in Washington.</p>
The mission of WDFW is to protect wildlife and to maximize hunting opportunity (see RCW77.04.12). Wolf recovery compromises both of these goals.	<p>The mission of WDFW is to preserve, protect, and perpetuate all wildlife species (RCW 77.04.020). The agency's mission statement reads as follows "The Washington Department of Fish and Wildlife serves Washington's citizens by protecting, restoring and enhancing fish and wildlife and their habitats, while providing sustainable fish and wildlife-related recreational and commercial opportunities." Wolf conservation and management fits as part of this mission.</p>
The proposed plan is not realistic and should be redone with better options to limit wolves and wolf-caused damage.	<p>The preferred alternative plan is believed to be the best balance to accomplish the dual conservation and management needs of the plan.</p>

Comment	Response
Wolf supporters need to realize that wolves were extirpated because of the problems they once caused. Supporters should not pretend that we can now have wolves back without some of these problems returning.	Many supporters of wolf recovery acknowledge that wolves cause conflicts, which explains their willingness to fund compensation programs for livestock depredation and other programs to reduce conflicts through non-lethal management. Many supporters also recognize that lethal control is a necessary part of wolf management. The importance of conflict management was recognized by all of the conservation representatives serving on the Wolf Working Group convened by WDFW.
Washington needs to avoid the old-style wolf management practices of Idaho, Montana, and Wyoming, which result in large numbers of wolves being slaughtered.	During the wolf recovery period, especially during the endangered and threatened phases, the plan prioritizes non-lethal methods over lethal control measures as much as possible. Nevertheless, lethal control may be necessary to resolve some wolf conflicts.
Commend WDFW for developing a wolf management plan based on science. I like the science presented in the plan.	Comment noted.
Thank you for creating a plan that supports wolf recovery.	Comment noted.
The plan needs to be strengthened to ensure wolf recovery.	Your comment was noted, but did not include specifics to respond to. The WDFW believes that implementation of the preferred alternative in the Final EIS/Recommended Plan would result in a recovered, self-sustaining wolf population.
I support a management plan that seeks long-term recovery of wolves in the state.	Comment noted. The WDFW believes that implementation of the preferred alternative in the Final EIS/Recommended Plan would result in a recovered, self-sustaining wolf population.
The plan needs to be more wolf-friendly. Washington is not Idaho, Montana, Wyoming, or Alaska.	Comment noted.
The plan states that its purpose is to establish a self-sustaining population of wolves in the state, but at a public meeting that I attended, it was stated that delisting was the purpose. This represents a conflict between a biologically established goal and a politically established goal.	Under state WAC 232-12-297, delisting can only occur when a population is no longer failing, declining, or vulnerable, and meets recovery plan objectives. WDFW believes that the wolf recovery goals in the recommended plan would result in a self-sustaining wolf population.
Science, species needs, and common sense should guide the WDFW's response to recovering and managing wolves, not compromising wolf recovery due to public opinion, politics, and fear. Science especially needs to be the top priority of the plan.	Comment noted. The wolf plan underwent scientific peer review, and scientific credibility is an important aspect of the conservation objectives and management strategies in the plan.
I support an actively managed wolf recovery plan for Washington.	Comment noted.
Wildlife managers should attempt to develop personal relationships with the ranching and sportsmen's communities to build support for wolf recovery.	Working with individual ranchers and outreach to sportsmen are critical components of the plan. Much of the work done by WDFW to recover wolves will be performed by wolf specialists, local biologists, and enforcement officers, who will engage individual ranchers and sportsmen as well as ranching and hunting groups and others on wolf-related issues.
Compromise over wolf management is needed between conservation groups and ranchers and hunters. This requires balance in the wolf plan.	A balanced approach is the best means to achieve wolf recovery. One of the important ways of reaching this balance during development of the wolf plan was to convene the Wolf Working Group, which provided input to WDFW on key elements of the plan and critically reviewed its contents in light of biological and social considerations.
Wolves should be managed through efforts to	The plan addresses the need for creating greater social tolerance

Comment	Response
increase social tolerance.	for wolves by 1) providing a generous compensation package for confirmed and probable livestock depredations by wolves, 2) providing ranchers with access to non-lethal deterrence measures, and 3) providing various options for lethal control of depredating wolves. Outreach and education is also an important part of the plan.
The plan strives to "establish a wolf conservation program that is achievable, realistic, fair, flexible....for meeting conservation goals." This is commendable, but how will WDFW balance priorities when they are in conflict? WDFW should have some plan of action to address these conflicts.	The plan is the means to identify actions to address conflicts. While wolves are listed, actions will be prioritized to ensure recovery; approaches become more flexible as the species' numbers and distribution reach recovery. Chapter 12 includes strategies and tasks; Chapter 13 includes high priority tasks for implementation in the first six years.
Wolf management options need to be more flexible in addressing problems that develop and to maintain public confidence that wolf recovery will occur without significant adverse impacts to other resources (i.e., wildlife, livestock) and public safety.	Your comment was noted, but did not include specifics to respond to. There is flexibility in the plan for WDFW to review and resolve specific conflict situations on a case-by-case basis for a number of management issues. These include wolf-livestock and wolf-human conflicts (including when to use of lethal control), conflicts involving wild ungulates (including at winter feeding sites), conflicts between wolves and listed species, and implementation of protective measures at wolf den sites.
WDFW should not manage wolves. It should leave wolves alone and let nature determine the proper balance.	WDFW is responsible for preserving, protecting and perpetuating native wildlife species in Washington. While sometimes this can mean no direct management, there are times that may require management in order to recover the species within the state and to resolve conflicts if they occur. Listed species typically require conservation measures in order to recover populations. In the case of wolves, addressing and reducing conflicts is an important part of conservation.
WDFW has a reputation for being heavy handed with landowners. A new attitude would greatly help secure cooperation for projects like the proposed wolf plan.	Comment noted.
A new wolf plan should be created that is coordinated with local governments. The state plan should also be compatible with the federal plan that has delisted wolves in eastern Washington.	WDFW values its relationships with local government and recognizes the need for coordination. All of the public, including local governments, were provided opportunities to comment on the recommended wolf plan. The statewide scope of the plan limited WDFW's ability to reach out to local governments in a detailed way, but regional WDFW staff were (and still are) available to discuss wolf issues and the plan with local governments. The recommended wolf plan addresses wolf conservation and management needs in Washington. Its downlisting and delisting objectives are largely independent of the federal delisting criteria that were applied to the Northern Rocky Mountains Distinct Population Segment. However, other parameters of the recommended plan are consistent with the federal recovery plan.
WDFW should have consulted with Okanogan County during the preparation of the wolf plan. Okanogan County has a local ordinance that requires WDFW to participate in coordination efforts.	WDFW values its relationships with local government and recognizes the need for coordination. All of the public, including local governments, were provided opportunities to comment on the recommended wolf plan. The Okanogan County Commission was one of several county administrations that submitted comments on the plan. The statewide scope of the plan limited WDFW's ability to reach out to local governments in a detailed

Comment	Response
	way, but regional WDFW staff were (and still are) available to discuss wolf issues and the plan with local governments.
WDFW's actions to overstep state constitutional laws and ignore local governments are an act of sedition.	Comment noted.
The plan states that there will be "a fair balance between conservation needs and the needs of the public" but how will this balance be determined and by whom? What process or procedures will be used to determine imbalances when conservation needs and public desires are in conflict?	The draft environmental impact analysis proposed a range of alternatives that addressed the balance between wolf conservation and management needed to ensure wolf recovery, while addressing potential conflicts. WDFW believes the Final EIS/Recommended Plan, with the revised preferred alternative, best addresses this balance.
The management plan has objectives that also state that management will "not negatively impact the recovery or long-term perpetuation" of a sustainable wolf population. How will these negative impacts be measured or determined and who will participate in that decision-making?	Monitoring of the recovering wolf population will be an important part of assessing the effects of management actions on the state's wolf population during different phases of recovery (i.e., endangered, threatened, and sensitive status). WDFW and the U.S. Fish and Wildlife Service (in areas where wolves are federally listed) will coordinate on decision-making on wolf-recovery.
How will WDFW take into consideration the beneficial role of ecosystems versus hunter concerns with reductions in game numbers?	The ecosystem role of wolves is described and recognized in the wolf plan. The revised plan includes an approach for addressing wolf-ungulate conflicts if there were an "at risk" ungulate population where it was determined that wolf predation was a primary factor limiting the population. In these situations, WDFW would assess methods for resolving such conflicts on a case-by-case basis. Management decisions would be based on scientific principles and would not jeopardize the health of a recovering wolf population, either statewide, or within a recovery region.
The plan relies too much on wolf recovery information from the Northern Rocky Mountain States. Washington has a higher human population, higher percent forest cover, lower sheep abundance, and lower levels of rangeland grazing than most western states. Data from the Great Lakes states may be more appropriate for Washington.	More information from the Great Lakes States was included in the revised plan.
Greater detail is needed in the plan about how WDFW will document reproductive success through December, partners that will assist WDFW in wolf recovery, survey techniques, budget considerations, and how wolf recovery goals will be met without adequate staffing.	Many of these details were in the draft plan, and others have been added to the Final EIS/Recommended Plan. One way to realize cost savings is to partner with other agencies and entities on shared goals; this is emphasized in the plan.
Getting different federal and state agencies, the private sector, and the tribes to agree on this plan will never happen.	Final approval of the plan is by the Washington Fish and Wildlife Commission. The plan recognizes the wide range of public values and opinions about wolf management in Washington, and has addressed this in the plan. While almost no one may be totally happy with the plan, it is recognized as a compromise that hopefully, most can live with. There is no goal to have complete agreement on the plan, and it is hoped that it is a balance that can be supported for implementation. Other entities have participated in reviews of the plan, and WDFW currently collaborates with other federal and state agencies on wolf conservation and management issues in Washington. Individual tribes are not required to agree to the wolf plan and may choose to develop their own wolf management plans. WDFW also hopes that the

Comment	Response
	involvement of the member stakeholder groups in the Wolf Working Group will result in broader acceptance of the final wolf plan by different agencies, groups, and private individuals.
Information gaps exist in the plan and need to be addressed with sound science before a comprehensive plan is approved. This will allow better wolf management decisions to be made. More detail is needed on the following: assessment of genetic viability, control of poaching, and historical prey population estimates.	Additional information on genetic viability was added to the plan and a population persistence modeling was conducted for the plan objectives. Additional information was added on genetics, and strategies to address and reduce illegal killing of wolves. Reliable estimates of historical prey populations are not available for the state.
The only discussion should be why it has taken so long to recover wolves. They are a natural predator, like us. What are people afraid of?	Wolf recovery in Washington has only recently become possible due to recovery of populations in adjacent states and provinces, which provide a source of animals dispersing naturally into Washington.
Without a state management plan, wolf protection in Washington defaults to the U.S. Fish and Wildlife Service not WDFW. Opportunities were missed to address wolf recovery sooner, especially in the Methow Valley where wolves have occurred for some time.	Wolves are protected under both state and federal law in Washington, regardless of whether there is a state management plan. Wolves have only recently been re-establishing in Washington, and it is in recognition of that, and the need for a state recovery plan for the species, that the state wolf conservation and management plan was initiated in 2007.
More time is needed to consider whether recovery of wolves in Washington is a good idea.	Wolves are already dispersing into the state and establishing resident packs. The Draft EIS included a “no action” alternative, but this was not selected as the preferred because it would not result in addressing how the WDFW would manage wolves as they naturally disperse into the state. The diversity of values about whether recovery is a good idea was explored during the Draft EIS process.
The draft plan is an obvious attempt by WDFW to appease the needs of livestock owners at the expense of recovering wolves at a scientifically sustainable population size.	The conservation objectives of the plan are believed to be scientifically credible when combined with the distribution and 3-year criteria. In the Final EIS/Recommended Plan, a modeling exercise was conducted to predict whether 15 breeding pairs would persist on the landscape. It was determined that they would, as long as they were allowed to increase and were not held at that number. Regional recovery objectives were also fixed, rather than having unassigned breeding pair distribution.
Wolf recovery, including the preparation of this plan, is a waste of money.	Comment noted.
Who exactly made the decision to manage wolves and allow them to recover? Where does the mandate to develop this plan come from?	Wolves are a state endangered species, and are naturally dispersing back into the state on their own from populations in adjacent states and provinces. WDFW is legally required to develop recovery plans for listed species in the state under WAC 232-12-297. The Draft EIS included a “no action” alternative, under which no plan would be developed. This was not selected as the preferred alternative because it would not result in addressing how the WDFW would manage wolves as they naturally disperse into the state.
I appreciate the effort by WDFW and the Wolf Working Group on a plan meant to reestablish wolves in the state and to minimize impacts to livestock owners and others in a way that will not impact the recovery of wolves. Obviously much time and thought has been put into the plan.	Comment noted.

Comment	Response
I like WDFW's proactive and collaborative approach to managing wolves and planning for their recovery, including using a citizen working group to advise the preparation of the wolf plan.	Comment noted. The stakeholder process involving the Wolf Working Group helped in the development of a balanced draft wolf conservation and management plan for the state.
One of public attitude surveys indicates that 75% of the public in Washington support wolf recovery. Therefore, special interest groups (i.e., livestock owners, hunters, grazing allotment owners) should not have undue influence on management of wolves in the state, especially on public lands. Additionally, the Wolf Working Group appears to be evenly split between wolf supporters and wolf detractors rather than reflecting the strong support for wolves. This discrepancy may reflect a bias against wolf recovery.	Conservation and management of listed species, including wolves, in the state is based on the need to reestablish viable and self-sustaining populations of those species. WDFW believed that a citizen group comprised evenly of wolf advocates and stakeholders affected by wolf recovery would be more successful in advising the agency on developing a balanced conservation and management plan for wolves than a group dominated by either conservationists or affected stakeholders.
Hunters pay for the budget of WDFW and its wildlife management program, therefore, the department should be more accountable to the needs of hunters. Furthermore, hunters should have greater influence in management decisions, including wolf restoration.	<p>Fishing and hunting license revenues currently exceed one-third of WDFW's funding. However, nearly all of WDFW's wolf management activities are funded through federal grants and state nongame revenues. Hunter license revenues are not being used for wolf management activities.</p> <p>Conservation and management of wildlife, including wolves, benefits all citizens of the state. Therefore, everyone has had an opportunity to participate in and comment on development of the recommended wolf plan. Adequate funding for wildlife (and wolves) will rely on support from all citizens.</p>
<b>Wolf Working Group</b>	
The Wolf Working Group is biased towards hunting organizations, ranchers, and private forestland owners, and these groups have an openly professed animosity toward wolves.	The Wolf Working Group was comprised of citizens representing a broad range of views about wolves and wolf management (member representatives are listed in Appendix B of the Final EIS/Recommended Plan). These included conservation groups, hunting, livestock operators, outdoor recreationists, biologists, timber industry, etc. Broad representation of values was needed to identify issues and develop recommendations for a balanced wolf conservation and management plan.
Development of the plan was biased towards the opinions of hunting groups. I am shocked that a member of Safari Club International served on the Wolf Working Group, which is obviously a one-sided group. Who were your animal advocates on the working group? Why didn't you have representatives on the Working Group to defend wolves.	The Wolf Working Group was comprised of citizens representing a broad range of views about wolves and wolf management (member representatives are listed in Appendix B of the Final EIS/Recommended Plan). These included conservation groups, hunting, livestock operators, outdoor recreationists, biologists, timber industry, etc. Broad representation of values was needed to identify issues and develop recommendations for a balanced wolf conservation and management plan.
The plan appears to have been developed to satisfy a minority of individuals (i.e., cattle industry, hunters) who oppose wolf recovery. This agency has historically been run by hunters for the benefit of hunters, thus the plan has a pro-hunting bias.	The Wolf Working Group was comprised of citizens representing a broad range of views about wolves and wolf management (member representatives are listed in Appendix B of the Final EIS/Recommended Plan). These included conservation groups, hunting, livestock operators, outdoor recreationists, biologists, timber industry, etc. Broad representation of values was needed to identify issues and develop recommendations for a balanced wolf conservation and management plan.
The Wolf Working Group is biased towards wolf	The Wolf Working Group was comprised of citizens representing

Comment	Response
lovers and conservation groups.	a broad range of views about wolves and wolf management (member representatives are listed in Appendix B of the Final EIS/Recommended Plan). These included conservation groups, hunting, livestock operators, outdoor recreationists, biologists, timber industry, etc. Broad representation of values was needed to identify issues and develop recommendations for a balanced wolf conservation and management plan.
The plan appears to have been developed to satisfy a minority of individuals (i.e., wolf lovers, the rich, anti-hunters, animal rights groups) who support wolf recovery.	The Wolf Working Group was comprised of citizens representing a broad range of views about wolves and wolf management (member representatives are listed in Appendix B of the Final EIS/Recommended Plan). These included conservation groups, hunting, livestock operators, outdoor recreationists, biologists, timber industry, etc. Broad representation of values was needed to identify issues and develop recommendations for a balanced wolf conservation and management plan.
WDFW is working too closely with anti-hunting interests, such as Wolf Haven International and Defenders of Wildlife. This shows WDFW does not have the best interests of the hunting community at heart.	WDFW works with a broad range of citizen stakeholder groups, including conservation and hunting groups.
The plan suggests that all parties of the Wolf Working Group were in agreement on many topics, but downplays the concerns and objections of many of the group's members (i.e., see Appendix D of the public review draft). The Minority Opinion should have received greater consideration when the plan's goals were formulated.	The Wolf Working Group reached consensus on nearly all aspects of the 2008 draft wolf conservation and management plan except the numbers of wolf breeding pairs needed for achieving downlisting and delisting (see Appendices C and J) in the recommended plan). The Minority Opinion proposed a delisting goal of 8 breeding pairs. The plan's recovery objective of 15 breeding pairs is considered barely adequate for a self-sustaining population. The delisting objectives must be scientifically supportable. Because 8 breeding pairs would not constitute a self-sustaining population, it was not included as an alternative in the Draft EIS. The proposal of 8 breeding pairs was reviewed by the 3 blind peer reviewers. Two of the three said it would not result in a viable, self-sustaining population of wolves. Both believed that the number of successful breeding pairs needed to achieve delisting should be higher and that the plan fell below current scientific standards for sustainability and genetic viability. The third reviewer considered the plan's recovery objectives of 15 successful breeding pairs for 3 consecutive years to be reasonable for achieving a recovered and self-sustaining wolf population. Because the breeding pair number proposed in the Minority Opinion is not scientifically supportable, it was not considered as a viable alternative to examine in the Draft EIS.
The plan is a political compromise between conflicting stakeholder groups. Actual recovery has nothing to do with political compromise, and should be based on biological factors.	Comment noted. The plan must be scientifically supported to ensure self-sustaining wolf populations. Biological factors, including scientific peer review, were very important in developing the conservation aspect of the plan, as well as determining risk. For the Final EIS/Recommended Plan, the WDFW conducted a modeling analysis of the proposed recovery delisting objective of 15 breeding pairs to test persistence on the landscape. Results indicated that it would, as long as the population was allowed to grow and it was not held at that number.
This plan does not ensure the "reestablishment of a self-sustaining population of gray wolves in Washington", but I believe it does "encourage	The Wolf Working Group recommendations were only one element in the development of the Draft EIS/plan. Other elements included public scoping, scientific and blind peer review,

Comment	Response
social tolerance for the species by addressing and reducing conflicts." The inability to meet these twin goals is a reflection of the diverse nature of the Wolf Working Group and the stipulation that consensus drive decision-making. I believe a better approach would have been to task a scientific group to devise a plan to reestablish a self-sustaining population of wolves and simultaneously charge a different group to devise a plan to foster social tolerance and reduce conflicts between that biologically defensible number of wolves and people. By mixing these charges in the present Wolf Working Group, a compromised plan has been produced that may not meet the full needs of wolves. WDFW still needs a plan to guide wolf recovery from a purely biological perspective.	internal WDFW review, broad public review, and public meetings held around the state. The wolf plan must be scientifically supported to ensure self-sustaining wolf populations. For the Final EIS/Recommended Plan, the WDFW ran additional modeling analyses of the proposed recovery delisting objective of 15 breeding pairs to determine if it would result in a self-sustaining population that would persist on the landscape. The results indicated that it would, as long as the population was allowed to grow and it was not held at that number.
When WDFW convened the Wolf Working Group to draft the plan, the group was tasked with attempting to provide input on a management plan, not selecting a target number for wolves that will maintain long-term viability, including adequate genetic diversity. WDFW should not be concerned with this at this time. Achieving long-term viability and genetic diversity were pushed by WDFW and were not considered by the Working Group, and therefore should not be considered in the wolf plan.	The Wolf Working Group was convened to advise WDFW on all aspects of the wolf conservation and management plan, including target numbers for downlisting and delisting. As described in Appendix I of the plan, WDFW originally suggested to the Working Group that specific numbers of wolf breeding pairs not be included in the plan until better information was gathered on wolf demographics and habitat use in Washington to better inform the development of state recovery targets. All Working Group members rejected this approach and preferred the inclusion of objectives with specific numbers in the plan, as in wolf recovery plans for other states.  WDFW has a mandate to preserve, protect, and perpetuate the native wildlife species of the state.
Why was the U.S. Fish and Wildlife Service not a participant in the Wolf Working Group?	The Wolf Working Group was intended to be a citizen stakeholder advisory group. For that reason, agencies were not invited participants. However, federal and state agencies did review the draft plan and provide input for the plan.
WDFW made very little effort to include tribal participation in developing the plan. The only involvement the tribes had was through the Wolf Interagency Committee, which has only had 2 meetings over the past 2.5 years, and little participation in developing the plan. It would have been appropriate for the tribes to participate in developing the plan given their co-manager role.	The Wolf Working Group is a citizen advisory group, whereas Washington state government, including WDFW, works with tribes on a government to government basis. Tribes were asked to provide peer review and to comment on the draft plan, and some did so. Tribes can also develop their own wolf management plans for tribal lands.
<b>Peer Review</b>	
Commend WDFW for seeking outside scientific peer-review of the plan.	Comment noted. WDFW conducts outside scientific review of all of its recovery plans and status reviews.
Blind scientific peer review of the plan is very important but it should have been conducted prior to public review.	WDFW conducted an extensive peer review process in 2008, prior to completion of the Draft EIS/Plan. A total of 43 reviewers provided comments. The Department undertook the blind peer review at the request of the Washington Fish and Wildlife Commission at the time of the public review.
Results from the blind peer review should be incorporated into the final plan.	They were.

Comment	Response
<b>General</b>	
How much did it cost to prepare this plan? It must have been a lot.	Approximately \$250,000.
A vote should be held on whether or not to recover wolves, with every license buying person in Washington being allowed to vote.	Comment noted. The Department is entrusted by all citizens of the state to preserve, protect, and perpetuate native wildlife species in Washington.
Only comments from Washington residents should be considered in public review of the plan.	Under the State Environmental Policy Act, comments must be taken from all sources, including those from outside Washington.
Why is it that a state (Washington) with 6 million residents and a planet with 6.8 billion people refuses to limit its own human population while claiming to be able to manage the number of wolves?	Comment noted, but was beyond the scope of the plan.
Information on historical numbers of wolves and prey population sizes should be presented in the Executive Summary.	While too detailed for inclusion in the Executive Summary, this information is presented in Chapters 2 and 5.
The Executive Summary is deceptive.	This comment was noted, but was not specific enough to respond to. The Executive Summary is a brief summary of the material contained in the other chapters of the plan.
My solution to the wolf controversy is that all wolves be interbred with chihuahuas to create "chihuawolves." These would be small enough that they would feed on rabbits instead of deer, elk, and livestock.	Comment noted.
<b>Draft EIS</b>	
The EIS should state more clearly that the state wolf plan only pertains to federally delisted regions of the state. The U.S. Fish and Wildlife Service has management authority over wolves in areas where they are federally-listed and the state wolf plan does not currently apply to this region.	The state plan, when approved, will apply state-wide. Where wolves remain federally listed in Washington, actions proposed for implementation under the plan will have to be consistent with federal law. If inconsistent, they would not be implemented. WDFW and USFWS will work together in managing wolves anywhere they remain federally listed. Clarification has been added to the Final EIS/Recommended Plan.
The draft environmental impact analysis should include a discussion of the potentially different federal and state downlisting and delisting criteria, and the ramifications for wolf management. If these criteria differ significantly, will wolves remain listed under only one set of laws?	There are no federal downlisting or delisting criteria for wolves in Washington. Clarification has been added to the Final EIS/Recommended Plan on state and federal laws pertaining to wolves.
National Environmental Policy Act (NEPA) is required due to federal involvement in the establishment of wolves in Washington and the creation of WDFW's wolf plan. NEPA requires federal agencies to coordinate with local governments during project assessments.	There is no federal involvement in the development of the state's wolf plan and there is no plan to reintroduce wolves to Washington. As a result, there is no requirement for a NEPA assessment. WDFW is developing its wolf conservation and management plan under the state's Environmental Policy Act.
The draft environmental impact analysis proposes 4 alternatives but 3 of them are extremely similar. By failing to propose a reasonable range of viable alternatives in the draft environmental impact analysis, WDFW violates State Environmental Policy Act regulations. First, WDFW fails to consider recovery targets greater or less than 15 breeding pairs in any of its alternatives.	Alternatives with fewer than 15 breeding pairs for achieving delisting were considered but eliminated from detailed analysis because they did not meet the purpose and need of the plan, which is to reestablish a viable and self-sustaining wolf population in Washington (see Section 3.1 of the Draft EIS); as were alternatives to restore wolf populations to historic levels. As noted in the comment, the Draft EIS did not include an alternative with greater than 15 breeding pairs because 15 were believed to provide for a

Comment	Response
Second, WDFW fails to consider prohibiting all lethal management activities until wolves have recovered in any of its alternatives.	self-sustaining population, and it also represented the recommendations of the WDFW Wolf Working Group. For the Final EIS/Recommended Plan, the WDFW conducted a modeling analysis of the proposed recovery delisting objective of 15 breeding pairs to test persistence on the landscape. Results indicated that it would, as long as the population was allowed to grow and it was not held at that number.  Alternative 3 in the Draft EIS placed the greatest emphasis on nonlethal control measures and limited use of lethal control. While lethal control is considered a necessary tool for reducing wolf depredation on livestock, WDFW will take steps to limit its use during endangered and threatened status through non-lethal deterrents and modified husbandry practices.
The draft environmental impact analysis needs to give a better accounting of the future costs of recovering wolves in the state.	Cost estimates are presented in the Final EIS/Recommended Plan for 3 state biennia, or 6 years – through 2017 (Chapter 13). Projections of costs beyond 2017 are too uncertain to present.
The draft EIS states that it evaluates the draft wolf plan based on environmental issues. This conflicts with the plan's stated goal to achieve delisting, which is a political goal.	The State Environmental Policy Act examines potential environmental impacts of proposed projects, whereas the purpose of the wolf plan is to meet the state requirements for a recovery plan for listed species, while managing conflicts.
State Environmental Policy Act (SEPA) documents require that the economic costs of proposed projects be explained. This draft environmental impact analysis does not do this.	This comment is incorrect. The State Environmental Policy Act (SEPA) only requires potential environmental impacts to be reviewed, thus potential economic impacts were not assessed in the Draft EIS.
Why is WDFW conducting an environmental impact analysis when it says it does not intend to reintroduce wolves to the state?	Typically, a State Environmental Policy Act (SEPA) analysis is not conducted on recovery plans for listed species. Because the wolf plan includes management as well as conservation, it has the potential to have an adverse impact on the environment (wolf recovery). For that reason, the plan was developed under the SEPA process. There are no reintroductions of wolves planned for the state; the SEPA analysis addresses management of wolves that have dispersed into Washington on their own.
WDFW's public meeting process is nothing but a formality. You have already made up your mind - it's all about money.	The 12 public meetings provided an opportunity for WDFW staff to receive verbal comments from the public on the draft EIS/plan. Written and electronic comments were also considered in producing the final EIS/plan. The public meetings also allowed WDFW to answer questions from the audience about wolves.
WDFW did not provide enough public hearings on the wolf plan, including in less populated areas of the state, or schedule them at more convenient times to encourage greater attendance by working people. Also, meetings should not have been held during the hunting season.	Public meetings were but one component of opportunity for the public to provide comments to WDFW on the draft EIS/plan. It's never easy to meet everyone's needs regarding public meeting dates and locations. WDFW believes the 12 public meetings held around the state were sufficient to meet the public's need on this topic. Meeting dates were scheduled to be early in the 3-month public review period (October – January), and not conflict with holidays and times of inclement weather.
Some public meetings should have been located in rural areas near potential wolf habitat, which would make it easier for residents to attend public meetings rather than drive 100 miles to attend the meetings that did occur.	Public meetings were but one component of opportunity for the public to provide comments to WDFW on the draft EIS/plan. It's never easy to meet everyone's needs re: public meeting dates and locations. The 12 public meetings were held in both rural and urban locations around the state; and tried to balance access for the largest number of people. Rural areas included Colville, Okanogan, and Clarkston.
The draft EIS lacks an analysis regarding	The Draft EIS discusses various aspects of human impacts on

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Washington's ongoing human population impact on wolf recovery. This analysis should also examine impacts for a 100-year period.	wolves (see background sections of the various elements covered in Chapter 4), with more extensive discussion presented in the recommended wolf plan. SEPA does not require a 100-year analysis of impacts.
The Executive Summary doesn't explain the purpose of the proposed plan and the reasons for the numbers of breeding pairs being proposed.	While the Executive Summary of the DEIS only briefly described the purpose of the plan, more detailed information on the proposed numbers of breeding pairs appears elsewhere in the DEIS and plan (Chapter 3).
The Executive Summary is balanced but does not clearly indicate the differences between Alternatives 2 & 3.	The main body of the DEIS gave greater detail on the differences between Alternatives 2 and 3.
Support Alternative 4.	Comment noted.
Support Alternative 4 because of opposition to using the small number of 15 breeding pairs in Alternatives 1, 2, and 3 as an appropriate delisting criterion.	Comment noted.
Support Alternative 4 if delisting numbers are increased to 30 breeding pairs.	Comment noted.
Support Alternative 3.	Comment noted.
Support Alternative 3, but with greater wolf numbers so that a viable population is established.	Comment noted.
Support Alternative 2, which provides a reasonable and balanced approach to meeting the needs of wolf recovery, ranchers, and others.	Comment noted.
Support Alternative 2, but with greater wolf numbers.	Comment noted.
Support many aspects of the draft plan.	Comment noted.
Support Alternative 1	Comment noted.
Support Alternative 1, but would prefer 0 wolves.	Comment noted.
Do not support any of the alternatives in the draft environmental impact analysis.	Comment noted.
Support the Minority Report (see Appendix D of the draft wolf plan), which should have been included as an alternative.	Comment noted. The Minority Report was an alternative considered, but eliminated from detailed analysis in the DEIS because it did not meet the goal of the plan to restore a self-sustaining population not included as an alternative in the DEIS because proposed a delisting objective of 8 breeding pairs. This number of wolves is too small to represent a viable, self-sustaining wolf population, and it did not meet the purpose of the plan. The delisting objectives must be scientifically supportable. The plan's recovery objective of 15 breeding pairs is considered barely adequate for a self-sustaining population. The proposal of 8 breeding pairs was also reviewed by the 3 blind peer reviewers, who also believed that 8 breeding pairs would not support recovery in Washington and fell below current scientific standards for sustainability and genetic viability. Because the breeding pair number proposed in the Minority Report is not scientifically supportable, it was not considered as a viable alternative to examine in the Draft EIS.
Support "Alternative 1A". This proposal has a trigger of 3 breeding pairs to re-classify wolves to threatened status and 6 breeding pairs to re-classify wolves to sensitive status. Upon reaching sensitive status, WDFW would immediately	WDFW believes that any process recommending fewer than 15 wolf breeding pairs would not result in the reestablishment of a viable and self-sustaining wolf population in Washington at the time of delisting. The breeding pair numbers suggested in this comment are too small to support downlisting from endangered to

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convene a diverse group at the Ruckelshaus Center that would determine a final number of breeding pairs for achieving delisting. Under this proposal, wolves could be distributed anywhere in the state, including the Olympic Peninsula.	threatened status and from threatened to sensitive status. In addition, convening a group through the Ruckelshaus Center to establish the delisting objective would delay completion of a final wolf plan and introduce a new decision-making process. WDFW has a mandate to preserve, protect, and perpetuate the native wildlife species of the state. In addition, WAC 232-12-297 requires WDFW to develop recovery plans for state listed species.
Support "Alternative 1A", but would prefer 0 wolves.	Comment noted.
The Minority Report will not achieve wolf recovery.	Blind peer reviewers agreed that the Minority Report goal of 8 breeding pairs would not result in a self-sustaining, recovered wolf population in Washington.
Keeping wolf numbers at very low levels, as proposed under the Minority Report, would more likely restrict wolves to extreme eastern Washington in areas devoted to livestock production and might not allow wolves to spread more broadly across the state to areas away from livestock production. A smaller wolf population restricted to eastern Washington might be more of a problem than a larger population that is well distributed across the state.	Commented noted. These numbers proposed under the Minority Report were not evaluated in the Draft EIS because they would not result in a self-sustaining population distributed across a significant portion of the species' historical range in Washington.
The 4 alternatives of the draft environmental impact analysis are too restricted, with 3 of them set at 15 breeding pairs. Why isn't an alternative with smaller numbers of breeding pairs considered?	Fifteen breeding pairs are considered the minimum number that would represent a self-sustaining wolf population in Washington at the time of delisting. WDFW and blind peer reviewers believe that delisting targets of fewer than 15 breeding pairs would not result in a viable and self-sustaining wolf population for the state. Therefore the recommendation for fewer than 15 breeding pairs does not meet WDFW's legal mandate with respect to recovering listed species under state law (WAC 232-12-297). WDFW does not believe that 8 breeding pairs represents a genetically viable wolf population. Therefore, alternatives with fewer than 15 breeding pairs would not meet WDFW's legal requirement for recovering listed species and were not considered in the DEIS.
There should be an alternative that replaces the stakeholder developed conservation goals with language that outlines a research strategy required for obtaining the necessary scientific information to set biologically viable wolf conservation goals.	Delaying the establishment of downlisting and delisting objectives until adequate information from Washington could be obtained for setting biologically determined numbers of breeding pairs was considered early in the development of the wolf plan (see Appendix I of the recommended plan). The Wolf Working Group, and WDFW believed that public understanding and acceptance of the final wolf plan would be greatly enhanced by having recovery objectives established for downlisting and delisting in the plan.
There should be an alternative that provides for a minimum genetically viable population, prevents harassment of wolves on public lands by livestock owners and agencies, that limits compensation for wolf depredations to private lands only, and prevents livestock from grazing near existing wolf denning and rendezvous sites.	Comment noted. Among the alternatives considered in the Draft EIS, Alternative 3 was used as the alternative having the greatest emphasis on protection and restoration of wolves in Washington. It had the highest standard for recovery objectives and was the most conservative in its use of management tools for addressing conflicts. As such, some of the conservation and management approaches of Alternative 3 were similar to those proposed in this comment.
There should be an alternative for hunting wolves now in order to control their numbers and prevent damage to livestock operators and game herds.	The wolf is listed as endangered in Washington under both state and, in the western two-thirds of the state, federal law. Wolves would not be proposed for hunting until after they are delisted

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	from both state and federal law. The plan addresses how conflicts will be addressed while wolves remain listed.
"No wolves" should have been included as an alternative.	The wolf is a native species to Washington and listed as endangered. The WDFW has a mandate to preserve, protect, and perpetuate the native wildlife species of the state. Two sideboards of the plan were no wolves would be reintroduced, and "no wolves" was not an option. Wolves are dispersing on their own into the state; the plan will provide for how the state will manage them.
Alternative 2 is the preferred alternative, yet according to the Draft EIS, Alternative 3 is predicted to have a higher probability of achieving long-term recovery. Why was Alternative 2 preferred over Alternative 3 in the Draft EIS?	Alternative 3 is the conservation alternative and does provide a higher probability of recovering wolves. It is more restrictive of when lethal control would be used. Alternative 2 was selected as the preferred alternative in the Draft EIS because it meets the biological requirements for recovering wolves in Washington, but takes a more balanced approach in addressing conflicts with livestock and wild ungulates.
All of the alternatives are too complicated. The wolf plan should be shorter and kept simple.	The Draft EIS/plan are complex and long because of the many issues involved in wolf conservation and management and because of the public's strong concerns that an adequate plan be developed.
The hiring of wolf specialists is mentioned only in Alternatives 2 and 3. It is inconceivable that WDFW would not also hire wolf specialists under Alternative 1. Therefore, the EIS analysis provides alternatives with false choices that don't truly exist.	Wolf specialists would be hired under Alternatives 1, 2, and 3. However, under Alternative 1, they would not participate in public outreach and education efforts, and would only conduct monitoring and conflict management. Under Alternative 1, outreach and education would be conducted at a reduced level by other WDFW staff as time allowed.
Support the increased education and outreach efforts called for in Alternative 3.	Comment noted.
Agree with Alternative 3 that lethal take of wolves in the act of attacking a dog should only be allowed by private citizens on private and public land only after wolves are delisted.	Comment noted.
Discussion of translocation is buried in the Draft EIS. This is a controversial topic and needs stronger coverage in the final EIS.	Translocation was one of a number of conservation and management tools for wolves evaluated in the Draft EIS. Any proposal to conduct wolf translocation in the future would go through a separate and much more detailed EIS process. Further information summarizing translocation appears in Chapter 3, Section B, and Chapter 12, Task 3, of the recommended wolf plan.
WDFW downplayed the likelihood of translocation to the Olympic Peninsula at the Aberdeen public meeting, but the draft environmental impact analysis and plan makes it sound very likely that it will happen. I feel misled.	Translocation was one of a number of conservation and management tools for wolves evaluated in the Draft EIS. Any proposal to conduct wolf translocation in the future would go through a separate and much more detailed EIS process. Further information summarizing translocation appears in Chapter 3, Section B, and Chapter 12, Task 3, of the recommended wolf plan.
Each alternative should describe how attacks on people, no matter how unlikely, will be handled.	Any attacks on people would be handled the same in each of the 4 alternatives. Chapter 12, Task 6.1, of the recommended plan, has detailed information on how wolf attacks on humans and other potential safety concerns involving wolves would be handled. Depending on the situation, non-lethal methods would be used first, unless the situation dictates a more aggressive response, including immediate lethal control.
The Draft EIS does not discuss human safety.	This was discussed in Section 4.2.1 of the Draft EIS, and in Chapter 7 and Chapter 12, Task 6, of the Final EIS/Recommended Plan.

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Is WDFW suggesting in the Draft EIS that more forest practice rules will result from wolf recovery?	No. The Draft EIS states in Section 4.2.2 that no additional restrictions on private forestlands are anticipated in Washington due to wolf recovery. The Draft EIS further states that existing forest practice rules pertaining to wolves should be reviewed and possibly modified. Modification of the rules would likely reduce restrictions rather than increase them.
The Draft EIS indicates that wolf den sites will be protected during the time they are active, using limited time restrictions for a small area around the site. This approach seems reasonable while wolves are state protected but may not be needed after delisting.	Wolf management after delisting will be addressed in future management plans to be written after delisting occurs.
If Alternative 3 is supposed to provide more protection for wolves, why wait until sensitive status to use non-lethal injurious harassment? It seems like this makes Alternative 3 less attractive than the Preferred Alternative.	Non-lethal injurious harassment (i.e., rubber bullets, beanbags, etc.) have the potential to seriously injure a wolf if used wrong. Thus, Alternative 3 proposed scaling back this tool to sensitive status. This would have meant greater use of non-injurious harassment instead.
The Draft EIS doesn't define "generous compensation" or "full value." It also doesn't state who will pay for compensation.	<p>The recommended plan discusses compensation for wolf depredation on livestock in Chapter 4, Section G. The program described in the plan is one of the most generous in the nation because it pays livestock owners twice the current market value of their animal (for a confirmed wolf depredation) if it was killed on grazing sites of 100 or more acres, where the agency determines it would be difficult to survey the entire acreage. Most other compensation programs in the country pay only the full current market value for confirmed wolf depredation (see Chapter 4, Section C). Payment for probable wolf depredation is also higher under Washington's plan than in most other states. The higher payment ratio in Washington is based on the thought that if the grazing area is large and difficult to survey, there may be more livestock kills present that could not be found.</p> <p>The recommended plan also calls for development of a compensation program for unknown losses. This type of compensation is not paid under the programs of most states.</p> <p>"Full value" refers to the current market value of livestock, which is defined in the recommended plan as "the value of livestock at the time it would have normally gone to market."</p> <p>Funding for the proposed compensation program would be dependent upon funding from the Washington State Legislature or other sources.</p>
Alternative 2 calls for reducing wolf abundance in localized areas with at-risk ungulate populations if research has determined that wolf predation is a key limiting factor. A more detailed analysis should be provided for when reduction of wolves would be appropriate. For example, would alternate management methods be introduced prior to lethal reduction of wolves in an area? What would constitute a severely depressed elk population? WDFW should consider holding public meetings to discuss lethal take of wolves	This portion of the Preferred Alternative in the Final EIS/ Recommended Plan has been changed to state that if WDFW determined that wolf predation was a primary limiting factor for an "at-risk" ungulate population, and the wolf population in that wolf recovery region was healthy (i.e., it exceeds the delisting objectives for that recovery region), WDFW could consider reducing wolf abundance in the localized area occupied by the ungulate population before state delisting occurs. For the plan, an at-risk ungulate population is any federal or state listed ungulate population (e.g., Selkirk Mountain woodland caribou, Columbian white-tailed deer), or any ungulate population for which it is

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before authorizing wolf removals to protect wild ungulates.	<p>determined to have declined 25% or more below management objectives for three or more years and population trend analysis predicts a continued decline. For populations for which numeric estimates and/or management objectives are not currently available, it will not be possible to use a specific threshold to assess a need for management action. Instead WDFW will use other sources of information related to the population, such as harvest trends, hunter effort trends, sex and age ratios, and others.</p> <p>Under this form of management, wolves would be controlled by moving them to other areas, through lethal control, and/or with other control techniques. While wolves are recovering, non-lethal solutions will be prioritized to be used first. Before deciding to proceed with this type of management, WDFW would consider the status of wolves statewide as well as within the specific wolf recovery region where the ungulate impact was occurring. The extent of wolf control undertaken would not be sufficient to push the region's overall wolf population below delisting objectives and put it at risk. Management decisions of this type would be based on scientific principles and evaluated by WDFW.</p> <p>WDFW has made note of the last sentence in this comment suggesting that public meetings be held prior to authorizing wolf removals to protect at-risk ungulates.</p>
Alternatives 1, 2, and 3 call for lethal control or non-lethal control of wolves to manage game herds that are at-risk or below management objectives. WDFW should instead address the main threats to those herds, such as human development, habitat decline, and illegal hunting, rather than blaming wolves.	This portion of the Preferred Alternative in the Final EIS/ recommended plan has been changed to state that if WDFW determined that wolf predation was a <u>primary limiting factor</u> for an "at-risk" ungulate population, and the wolf population in that wolf recovery region was healthy (i.e., it exceeds the delisting objectives for that recovery region), WDFW could consider reducing wolf abundance in the localized area occupied by the ungulate population before state delisting occurs. This statement implies that WDFW would consider other factors involved in the decline of an at-risk ungulate population, but nevertheless might move forward with wolf control if it was determined that it would help recover the ungulate population. For more discussion on management of wolves in relation to at-risk ungulate populations, see Chapter 5, Section F, of the recommended wolf plan.
The draft plan makes recreational hunting an accepted casualty of wolf conservation. The Draft EIS mentions the possibility of wolf reduction to respond to significant ungulate population declines but such strategies won't be implemented until ungulate populations are found to be "at risk" and only after hunting opportunities have declined. The final plan needs to identify measures that WDFW will take to prevent significant declines in ungulate populations before they become "at-risk" from wolf predation.	The plan calls for managing ungulate populations and their habitats to provide both an adequate prey base for wolves and to maintain harvest opportunities for hunters. It does this through continued implementation of WDFW game management plans for elk, deer, and other ungulates, which should result in achieving healthy population objectives for these species.
Oppose killing wolves to maintain or increase ungulate populations and hunter harvest of ungulates.	Comment noted.
Oppose lethal control of wolves on public lands to reduce predation of ungulates.	Comment noted.

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Support placing greater restrictions, including reducing the length of hunting seasons, on hunter harvest of deer and elk to benefit wolf recovery, as described in Alternative 3.	Comment noted.
Support placing greater restrictions on hunter harvest of deer and elk to benefit wolf recovery, but would accept limited use of lethal control of wolves as a last resort to protect declining ungulate populations.	Comment noted.
Some wolf control will probably be necessary to assure adequate numbers of ungulates, but the viability of the wolf population must be assured.	Chapter 5, Section F, of the recommended plan has been changed to state that if WDFW determined that wolf predation was a primary limiting factor for an "at-risk" ungulate population, and the wolf population in that wolf recovery region was healthy (i.e., it exceeds the delisting objectives for that recovery region), WDFW could consider reducing wolf abundance in the localized area occupied by the ungulate population before state delisting occurs. Further, it states that under this form of management, the extent of wolf control undertaken would not be sufficient to push the region's overall wolf population below delisting objectives and put it at risk. This provides assurance that the viability of the wolf population would be maintained. For more discussion on management of wolves in relation to at-risk ungulate populations, see Chapter 5, Section F, of the recommended wolf plan.
Oppose reducing the length of hunting seasons or reducing harvest levels to benefit wolf recovery.	Comment noted.
Support the proposal in Alternative 1 to consider moving, or using lethal control, or other control methods on wolves to protect ungulate populations that are below herd objectives after wolves reach sensitive status.	Comment noted.
Support the control of wolves during all listed statuses to protect ungulate populations that may be declining due to wolves.	Comment noted.
Support reducing wolf numbers before ungulate populations in the state experience severe declines.	<p>Wolves are expected to have little or no overall effect on the abundance of elk and deer across most of Washington, but could cause them to decline in a few localized areas. The Final EIS/Recommended Plan provides for consideration of controlling wolves if they are found to be a primary limiting factor for "at risk" ungulate herds, which are defined as having declined 25% or more below management objectives for three or more years and population trend analysis predicts a continued decline.</p> <p>A management option to reduce wolf numbers when ungulate populations are healthy would likely prevent recovery of wolves in the state, and would not be consistent with the purpose of the recommended wolf plan.</p>
The terms "at-risk" and "limiting factor", as they pertain to ungulate populations, need to be better defined. The document states that it is those populations that are severely depressed and in danger of eventual extirpation. These terms also need to be better defined. The size of the area (i.e., watershed unit, GMU, etc.) pertaining to "at-risk" ungulate populations also needs to be more	The definition of an "at risk" ungulate population was clarified to be more specific in the Final EIS/Recommended Plan.

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clearly defined.	
Alternatives 2 and 3, which plan to manage deer and elk herds to benefit wolf recovery, will produce anger and resentment among hunters.	Comment noted. However, as described in the background sections of the plan (Chapters 5, 14), observations from Idaho, Montana, and Wyoming, where most elk and deer populations remain at or above management objectives, suggest that as wolf populations increase in Washington, they will have some localized impacts on ungulate abundance and habitat use, but they will have a relatively small impact at a statewide level. Thus, WDFW does not expect wolves to interfere with the harvest of deer and elk in most areas of the state.
The desire to adjust harvest levels of game to benefit wolves is greatly compromised by not having a requirement that tribal hunters must also reduce their harvest.	WDFW cannot regulate tribal harvest, which is reserved by federal treaties. WDFW works with many tribes in Washington to coordinate harvest strategies and will continue to do so after wolves recolonize the state.
The Draft EIS should have distinguished between the terms "opportunity to hunt" and "opportunity to harvest." I want to harvest game, not just hunt them.	WDFW provides opportunities to hunt, but cannot guarantee that a hunter will harvest an animal. Chapter 14, Section C, of the recommended plan shows that about 10% of elk hunters and 25-35% of deer hunters are successful annually, depending on location and year. As discussed in this chapter, wolves are expected to have limited effect on statewide harvest levels of deer and elk.
The term "improved habitat management", as used in the Draft EIS, is too vague regarding its use to improve ungulate numbers. The document needs to include specifics on how WDFW will accomplish this.	The recommended wolf plan states that ungulate populations and their habitat will be managed through the implementation of WDFW's game management plans (see Chapter 5, Section F; Chapter 12, Task 5.2.1). These plans contain more detailed information on desired habitat management for ungulates, thus inclusion of this type of information into the wolf plan is not necessary.
The term "flexibility in harvest strategies" simply means that WDFW will reduce the length of the hunting season and the number of hunting permits.	This comment is correct that "flexibility in harvest strategies" would most likely refer to increased restrictions on hunting. Most of the restrictions that might result from wolves would likely be to antlerless harvest and, where necessary, to reductions in permits. Reductions in season length would be one of the changes implemented.
The Draft EIS seems deliberately vague in describing the population effects of wolves on ungulates. The Draft EIS should provide an estimate of the amount of meat consumed per wolf per day to help readers assess the impacts of wolves on wild ungulates.	More detailed information on this topic is provided in Chapter 5 of the recommended plan. Predicted levels of wolf predation on ungulates in Washington now appear in this chapter (previously it was part of Chapter 14).
Any lethal control of wolves to benefit ungulate populations needs to be closely coordinated with other state and federal agencies whose lands are affected.	WDFW would closely coordinate any lethal control actions with appropriate state and federal agencies.
The Draft EIS is remiss in not mentioning the use of hunting as a tool for controlling wolves after delisting.	The recommended plan does address that hunting could occur in the future after wolves are delisted, and that this would go through a separate Commission process. This is described in Chapter 3, Section C.
Support treating wolf-related threats to other species through non-lethal control methods before resorting to lethal control.	The Final EIS/Recommended Plan prioritizes the use of non-lethal control methods when dealing with conflicts between wolves and species, especially in the early stages of recovery (e.g., Chapter 5, Section F).
<b>Chapter 1 – Introduction</b>	

Comment	Response
Why does the plan use the name "gray wolf" instead of "timber wolf"?	Gray wolf is the accepted common name used for wolves by wildlife biologists in the western United States and most areas of the world.
Wolf packs should be reintroduced into Washington from outside the state.	As stated in Chapter 1 of the wolf plan, WDFW has ruled out any reintroductions of wolves into Washington from other states or provinces. Reintroduction is unnecessary because wolves are already dispersing naturally into the state.
Reintroduction should be considered in the future as a means to improve the genetic heterogeneity of Washington's recovering wolf population.	As stated in Chapter 1 of the wolf plan, WDFW has ruled out any reintroductions of wolves into Washington from other states or provinces. Reintroductions would be highly controversial and divisive, and would detract from more important wolf conservation activities. If genetic research (Chapter 12, Task 11.2) determines that an isolated wolf population in Washington has reduced genetic diversity, an individual wolf from another population or pack in Washington may be moved into the population to increase genetic diversity in an effort to increase population viability (Chapter 12, Task 1.5).
Wolves should be reintroduced to the Olympic Peninsula from Vancouver Island or coastal British Columbia. The wolves from these locations are biologically most similar to those wolves extirpated from the Olympic Peninsula.	Comment noted; however, there are no plans to reintroduce wolves to the Olympic Peninsula.
Reintroduction should be considered in the future as a means to reestablish wolves on the Olympic peninsula and in the southern Cascades. This should be done rather than translocating Washington wolves out of other recovery regions in the state, which could potentially impact the populations in those recovery regions. Use of reintroduction in this way would speed recovery and increase genetic diversity.	Comment noted; however, there are no plans to reintroduce wolves to the Olympic Peninsula.
Oppose reintroduction of wolves from outside the state.	Comment noted. There are no plans to reintroduce wolves into Washington from outside the state.
I believe wolves have already been reintroduced to parts of the state and oppose this action by WDFW.	WDFW has no knowledge of any wolves ever being reintroduced to any part of Washington by anyone.
This is supposed to be a science-based plan, thus I am puzzled why reintroduction is not being considered. Reintroductions are conducted for many recovery programs for other wildlife species.	While reintroduction is a tool used to help recover a number of listed species, it is unnecessary for Washington because wolves are already dispersing naturally into the state.
I have learned that WDFW proposes to reintroduce 55 pairs of wolves into Washington.	There are many rumors about supposed reintroductions that have occurred or are rumored to be planned. These rumors are false. As stated in Chapter 1 of the plan, WDFW has no intention of reintroducing wolves to the state. Reintroduction is unnecessary because wolves are already dispersing naturally into the state.
The WDFW director made the ruling that wolves would be reintroduced to Washington. He has since been forced to resign.	This statement is false. On the contrary, as stated in Chapter 1 of the wolf plan, it was the former WDFW Director Jeff Koenings who made the decision that wolves would <u>not</u> be reintroduced into the state.
WDFW press releases indicate there are no plans to reintroduce wolves into Washington, but this is contradicted by the agency's large Draft EIS and wolf plan. This seems like trickery.	The Draft EIS and draft wolf plan both stated that wolves will not be reintroduced into Washington from other states or provinces. However, both indicated that wolves could be translocated from one recovery region of Washington to another if this is needed to accomplish wolf recovery. It is hoped that translocation will never

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	be needed and that wolf recovery will be achieved through natural dispersal to most areas of suitable habitat in the state.
Legislation and regulations are needed to permanently disallow the reintroduction of wolves into Washington.	Legislation and regulations of this type are not needed. WDFW recognizes the sensitivity of the issue and established a policy to not reintroduce wolves from outside the state.
<b>Chapter 2 - Background</b>	
I would like to see greater discussion of historical tribal views towards wolves.	Some additional information was added in the Final EIS/ recommended plan in Chapter 2, Section E. However, a detailed description of historical tribal views on wolves is beyond the scope of this document.
I know people who have seen wolves on the north side of the Blue Mountains recently, which tells me that wolves already inhabit this area.	The recommended plan (Chapter 2, Section B) includes updates on sighting reports and the current status of wolves in Washington, including the Blue Mountains, through July 2011.
The Methow Valley has supported a small population of wolves continually over the last several decades.	The recommended plan (Chapter 2, Section B) presents all of WDFW's documented knowledge of wolf reports and confirmed sightings in the Methow Valley and Okanogan County in recent decades through July 2011. Additional unknown animals could have been present.
I believe the Methow pack was transplanted there by WDFW, a conservation organization, or other people.	WDFW has no knowledge that the Lookout Pack was reintroduced or translocated by anyone. As stated in Chapter 1 of the plan, WDFW has ruled out any reintroductions of wolves into Washington from other states or provinces. Reintroduction is unnecessary because wolves are already dispersing naturally into the state. Furthermore, it would be highly controversial and divisive, and would detract from more important wolf conservation activities.
WDFW is underestimating the number of wolves currently in the state. I know/suspect there are more than 2 packs in the state already.	The recommended plan (Chapter 2, Section B) includes updates on sighting reports and the current status of wolves in Washington since the draft plan was published in 2009 and through July 2011.
Despite many years of extermination effort, wolves continue to exist in Washington in adequate numbers although they are too elusive to be found and counted.	The recommended plan (Chapter 2, Section B) includes updates on sighting reports and the current status of wolves in Washington since the draft plan was published in 2009 and through July 2011. WDFW will continue to follow up on leads to confirm additional wolf packs. If wolves are present, they typically leave tracks and are vocal, which usually leads to their detection by people. Updates on wolf status will be presented on the WDFW website.
The plan should be updated to reflect that wolves are now legally hunted in Idaho and Montana and information on harvest levels and impacts to wolf populations should be updated.	The Final Recommended Plan was updated to reflect the most recent legal status of wolves in these states, including a brief description of the hunting season that occurred in 2009-2010.
The plan should give greater detail on numbers of wolves killed by human-related accidents (i.e., vehicle collisions) in the Rocky Mountain States.	The recommended plan (Chapter 2, Section C) was updated to reflect that about 3% of the wolves in the northern Rocky Mountain states die from human-related accidents. More detailed information on this topic is beyond the scope of the plan, but can be found the U.S. Fish and Wildlife Service's annual wolf reports.
Wolves feed on salmon along the British Columbia coast. Greater discussion should be given in the plan about whether this could occur in Washington if wolves are present on the Olympic Peninsula.	The recommended plan (Chapter 2, Section C, Table 2) notes that salmon are eaten by wolves in coastal British Columbia and represent about 10% of the non-winter diet there. Similar use of salmon could occur in Washington, but this was considered too speculative to mention because the original wolves occurring in coastal Washington are now gone. It is unknown whether wolves reestablishing in this area would resume eating salmon in appreciable numbers.

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Wolves play an important role in ecosystems.	As noted in the comment, the reestablishment of wolves can help restore functioning ecosystems. Chapter 2, Section C, of the recommended plan discusses the scientific literature on this topic.
Wolves play an important part in regulating ecosystems and supporting biodiversity. Their recovery could lead to more resilient ecosystems, which could combat predicted climate-caused changes.	Wolves have the potential to make ecosystems more resilient to climate change in some locations. However, a variety of associated factors such as human management of wolves, their prey, and landscapes must also be considered and complicate predictions regarding wolves, ecosystem changes, and climate change.
Wolves will adversely affect the current balance of Washington's ecosystems.	Based on recent research in neighboring states, some of the ecosystem changes that wolf recovery may bring include changes in behavior and abundance of ungulates, increases in wildlife species that scavenge for all or part of their food, and changes in the composition of riparian forests and associated nongame species. Such changes could help ecosystems return to a more natural condition. The attitude that these changes will be "adverse" or "positive" is a matter of personal opinion.
I believe that the costs to humans and wildlife of restoring wolves outweigh the benefits in restoring the role of wolves in ecosystem function.	Under the recommended plan, WDFW believes that wolves can be recovered in the state, while minimizing the economic costs experienced by ranchers, hunters, and others. The plan contains various tools to reduce economic impacts. These include compensation for wolf depredation, non-lethal and lethal management of conflicts, and continued management of ungulate populations. This comment implies that most wildlife species will be hurt by wolf recovery, but this might occur only for some local populations of prey species. Instead, wolf recovery will likely benefit a number of species, while having little or no impact on most others (see Chapter 6 of the recommended plan).
Ranchers and farmers support a healthy environment, but wolves will not bring that.	WDFW believes that wolf recovery will generally benefit ecosystems in Washington.
Greater discussion of trophic cascades and the ecological importance of re-establishing wolves should be provided.	Information on these topics was added to Chapter 2, Section C.
I have seen the damage caused by excessive browsing of riparian vegetation by elk in water drainages of the Olympic Peninsula. Wolf recovery in this area would benefit riparian areas.	Research conducted by Beschta and Ripple (2008) suggested that wolf recovery could benefit riparian ecosystems on the Olympic Peninsula, but this conclusion should be confirmed through additional research.
The report by two professors at Oregon State University that wolves will lead to restoration of riparian areas on the Olympic Peninsula is a hoax. Stream bank erosion is caused by excessive rainfall in the area, not by too many elk.	In the absence of wolves, changes in ungulate behavior could include overbrowsing of riparian vegetation, which could result in reduced tree and shrub coverage in riparian areas and make these areas more prone to erosion. Research conducted by Beschta and Ripple (2008) suggested that wolf recovery could benefit riparian ecosystems on the Olympic Peninsula, but this conclusion should be confirmed through additional research.
If ungulate populations need to be controlled to prevent ecological damage, it should be done by hunters not wolves.	WDFW recognizes the need to balance social values with ecological values. Further, it considers hunting a valuable management tool to achieve wildlife population objectives. Given these considerations, both hunting and wolf predation will be factored into the management of ungulate populations in the state.
If wolves are federally delisted in eastern Washington, why is the state trying to recover them in that area, since the federal ESA no longer applies? This plan should apply only to the western 2/3 of the state, where wolves are still federally protected.	The wolf is listed as an endangered species under Washington state law, and the state's wolf plan is applicable to the state listing, not federal listing. The state plan serves as the recovery plan for the wolf in Washington, as specified under state law (WAC 232-12-297).

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Wolves are plentiful in Montana, Idaho, Wyoming, Canada, and Alaska. Why should they be considered endangered in Washington? Why should we be attempting to recover wolves in this state?	The state of Washington identifies endangered, threatened, and sensitive species (WAC 232-12-297), regardless of regional or tribal status. Wolves are listed under state law. The WDFW prepares recovery plans for state listed species (WAC 232-12-297). The goal of this work is to achieve viable and self-sustaining populations of these species in the state, thereby allowing state delisting to occur. The WDFW has a mandate to preserve, protect, and perpetuate wildlife species within Washington.
Washington is not required by federal law to recover wolves, so why are we doing it?	Wolves are a state endangered species and the WDFW prepares recovery plans for state listed species (WAC 232-12-297).
The plan should state whether wolves in the western two-thirds of the state are currently considered "essential" or "non-essential" under the federal Endangered Species Act. If wolves are federally listed again in eastern Washington, will they be considered "essential" or "non-essential"? How do these designations affect the granting of federal lethal control permits by the U.S. Fish and Wildlife Service?	Clarification on this issue was added to the final recommended wolf plan. Wolves listed under federal law in Washington are endangered and are not considered part of a "non-essential" experimental population that was reintroduced into Idaho and Yellowstone.
Wolves should be restored because of the mandates under federal and state endangered species laws.	Comment noted.
Why isn't the U.S. Fish and Wildlife Service including all of Washington state, as well as other states in the Pacific Northwest, in a single regional management strategy to recover wolves?	The U.S. Fish and Wildlife Service decided to recover wolves in the lower 48 states according to regional populations known as Distinct Population Segments (DPS). The U.S. Fish and Wildlife Service included the eastern one-third of Washington in the Northern Rocky Mountains DPS to include any wolves that might disperse out of the Idaho and Montana into Washington. The distance into the state that the western boundary of the DPS goes is based on the dispersal distances documented for wolves in the Northern Rocky Mountains DPS.
Washington is being forced to recover wolves because of a federal mandate.	This comment is incorrect. The state of Washington identifies endangered, threatened, and sensitive species (WAC 232-12-297), regardless of federal or tribal status. Wolves are listed under state law. The WDFW prepares recovery plans for state listed species (WAC 232-12-297). The goal of this work is to achieve viable and self-sustaining populations of these species in the state, thereby allowing state delisting to occur. The WDFW has a mandate to preserve, protect, and perpetuate wildlife species within Washington. The state works cooperatively with the federal government to recover federally listed species.
As state delisting goals are approached and met, what actions will WDFW take to coordinate with the U.S. Fish and Wildlife Service to achieve federal delisting?	WDFW is currently working with the U.S. Fish and Wildlife Service in their determination of whether a federal Pacific Northwest distinct population segment (DPS) should be designated and, if so, the status of the wolves within it. If a DPS is designated, it is anticipated the Service would develop a recovery plan for the DPS, which would identify recovery objectives for the DPS.
The plan needs added clarification on how its proposed objectives for state downlisting and delisting may be impacted by the federally listed status of wolves, particularly in the western two-thirds of the state. In particular, the U.S. Fish and Wildlife Service's approach to wolf recovery and	WDFW is currently working with the U.S. Fish and Wildlife Service in their determination of whether a federal Pacific Northwest distinct population segment (DPS) should be designated and, if so, the status of the wolves within it. If a DPS is designated, it is anticipated the Service would develop a recovery plan for the DPS, which would identify recovery objectives for the

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delisting elsewhere has been based on identifying distinct population segments of wolves. Will this occur for wolves in the western two-thirds of Washington?	DPS.
The U.S. Fish and Wildlife Service should not be involved in wolf management in Washington. This is a state issue that should be managed by the state.	The wolf is listed as federally endangered in the western two thirds of Washington, and the U.S Fish and Wildlife Service has lead authority over wolf management in that portion of the state. Wolves are also a state endangered species, thus WDFW will coordinate with U.S. Fish and Wildlife Service on wolf recovery and management as long as the species remains federally listed. In areas of Washington where wolves are federally delisted, but remain state listed, WDFW has the lead management responsibility for the species.
Protection for wolves should be removed now.	The state's current wolf population is inadequate to remove any protections at this time. State delisting will occur when Washington meets the population objectives for delisting.
Wolves continue to play an important cultural role for Native Americans in Washington	Comment noted.
Wolves have a cultural role for our tribe; however, the ungulate populations that our tribal members rely on for subsistence are of significantly higher priority. Therefore, we don't want wolves in our area.	As mentioned in Chapter 2 of the plan, wolf management may vary among tribes in the state.
Have the tribes been involved with planning efforts for wolf conservation and management? Will tribes in Washington accept wolves within the boundaries of reservations as part of the management plan?	Tribes were offered an opportunity to provide input on the development of the Wolf Conservation and Management Plan for Washington. Wolf management may vary among tribes in the state, with some tribes willing to accept wolves on tribal lands, and others not willing to do so. Individual tribes in Washington are free to develop their own wolf management plans for tribal lands, which may or may not be consistent with the state wolf plan (see Chapter 2, Section D, of the recommended wolf plan). If issues were to arise over inconsistencies in wolf conservation and management between state and tribal governments, they could be discussed in government-to-government consultations between WDFW and the tribes.
What is the status of government to government discussion with the tribes? It is impractical to advance a plan that relies so heavily upon tribal lands for recovery without the participation of tribes. This plan should have consulted with the Tribes prior to moving forward, then come with a Draft EIS that incorporates Tribal support if it is there? WDFW should have consulted with the tribes prior to moving forward on the wolf plan, then come with a Draft EIS that incorporates tribal support if it exists.	Tribes were offered an opportunity to provide input on the development of the Wolf Conservation and Management Plan for Washington. Wolf management may vary among tribes in the state, with some tribes willing to accept wolves on tribal lands, and others not willing to do so. Individual tribes in Washington are free to develop their own wolf management plans for tribal lands, which may or may not be consistent with the state wolf plan (see Chapter 2, Section D, of the recommended wolf plan). If issues were to arise over inconsistencies in wolf conservation and management between state and tribal governments, they could be discussed in government-to-government consultations between WDFW and the tribes.
Concerned that wolves could be adversely affected by tribal hunting following removal from the federal Endangered Species Act.	While wolves are federally listed in Washington, tribes are subject to restrictions under the federal Endangered Species Act. After federal delisting, tribes may choose to develop their own management plans and regulations regarding wolves. These may or may not be consistent with the state wolf plan. If issues were to arise over inconsistencies, they would be discussed in government-to-government consultations between WDFW and the tribes.

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This section doesn't provide any information regarding potential economic impacts from wolf recovery.	Potential economic impacts are described in detail in Chapter 14 of the recommended wolf plan.
Regarding the large reported amount of support for wolf recovery among Washington residents, those that "oppose" wolf recovery are those who will be financially impacted (i.e., ranchers, hunters). People who support the plan will never have to live with it.	Comment noted.
Did any of the opinion survey questions inform respondents that wolves could someday kill 5,000-8,000 deer and elk annually?	None of the questions asked of respondents included estimates of the number of deer and elk that could be killed annually by wolves. Questions asked in the survey can be viewed at: <a href="http://wdfw.wa.gov/publications/pub.php?id=00433">http://wdfw.wa.gov/publications/pub.php?id=00433</a>
<b>Chapter 3 – Wolf Conservation</b>	
Concern that the plan's primary emphasis is delisting the wolf rather than obtaining a healthy population first.	Under the plan, wolves would not be delisted until they had achieved a healthy population. It is believed that the recovery objectives of 15 breeding pairs for three years, with distribution throughout a significant portion of the historic range, would constitute a healthy, self-sustaining population. Modeling of persistence indicated that 15 breeding pairs would persist on the landscape as long as they were allowed to increase and were not held at that number.
This chapter gives a thorough review of the current issues surrounding wolf recovery in the West but pays lip service to the many ideals of connectivity, genetic diversity, population sustainability, viability, etc., without addressing what WDFW will actually do on these issues. More detail is needed on how these issues will be addressed in practical terms.	Chapter 3 of the plan is intended to provide background information on conservation-related issues. Strategies and tasks for achieving wolf recovery are described in Chapter 12. Specific actions related to genetic diversity, population sustainability and viability, and connectivity are covered under Chapter 12, Tasks 1, 2, 3, and 7.
Modern conservation biology theory calls for recovery criteria for keystone species to be based not only on demographic viability, but also on restoration of the species' ecological role in ecosystems. For example, the ecological role of a large predator, such as the wolf, should be reestablished across significant portions of its range.	The primary goal of WDFW in recovering listed species is to reestablish viable and self-sustaining populations, which then allows delisting. While restoration of populations to levels that fulfill ecological function is desirable, this criterion is not part of existing recovery objectives under WAC-232-12-297. There are also no clear measures for assessing restoration of ecological function for most species. It is anticipated that wolves would begin to resume their ecological role as their population increases and reoccupies habitat. An expanded section describing the ecological role of wolves has been included in the recommended wolf plan (Chapter 2, Section C).
The plan should indicate that adequate scientific information is currently not available to determine if wolves in Washington will have to survive as a stand-alone population or whether there will be sufficient genetic exchange between the state's wolves and other populations in neighboring states and Canada. Given the strong efforts by Idaho, Montana, and British Columbia (southern areas) to reduce and maintain minimal wolf populations, there will probably not be many wolves left to disperse into Washington. This greatly weakens the plan's assumption of reliance	It's difficult to project future wolf numbers in other states. The WDFW conducted population modeling that included the influence of immigration on wolf population persistence. Results of these analyses demonstrated the importance of continued immigration of wolves from neighboring wolf populations in the recovery of Washington's wolf population. The population will be monitored as wolves recolonize the state to determine the frequency of successful dispersal between isolated populations of wolves both within the state and between Washington and adjacent populations in British Columbia, Idaho, and Oregon. Task 1.3.4 addresses the need to assess genetic characteristics and monitor the health of the wolf population through the collection

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on neighboring jurisdictions for sustaining Washington's wolf population. Without documented genetic exchange, WDFW cannot assume that Washington's wolf population is part of a larger metapopulation.	and analysis of biological samples from live-captured and dead wolves.
The plan should incorporate a stronger evaluation (habitat modeling) of connectivity between Washington and neighboring areas. Better information is also needed on the methods that WDFW will use to improve connectivity over time. Solid mechanisms for improving connectivity should be proposed so that wolf populations do not become or remain isolated. Currently, the plan relies mainly on translocation as the mechanism to address dispersal problems, but gives few other solutions for improving connectivity.	Carroll (2007) and Singleton et al. (2002) provide the only studies of habitat connectivity between Washington and neighboring areas (BC, ID, OR) for wolves. This information is presented in Chapter 3, Section A, of the wolf plan. Chapter 12, Task 7, of the plan presents several specific actions for conserving travel corridors to benefit wolves. These will hopefully enhance the natural movement of wolves enough that translocation will not be needed.
The I-5 corridor and Puget Sound represent nearly impossible barriers for wolves crossing into and recovering in the Pacific Coast region.	Potential barriers to connectivity are addressed in Chapter 3, Section A, of the final recommended wolf plan. The landscape permeability modeling by Singleton et al. (2002) indicates that the Puget Sound region could be a barrier to wolf dispersal between the Cascades and the Pacific Coast. While Singleton et al. (2002) considered the I-5 corridor to be a "potential barrier" to wolf dispersal, wolves have been documented dispersing across major interstate highways in other states (Idaho, Montana, and Wisconsin).
How will WDFW determine that wolves are moving between the recovery regions delineated in the plan?	Activities to monitor wolf movements between recovery regions are described in several tasks of Chapter 12 in the final recommended wolf plan. Tasks 1.3.3, 3.1, and 11.1 will monitor dispersal using radio tracking, howling surveys, and other methods. Tasks 1.3.4 and 11.2 will monitor genetic relationships of wolves to assess gene flow within and between wolf populations.
WDFW and the Washington State Department of Transportation should actively collaborate to plan highway crossing structures to enhance wolf movement.	This type of project would be evaluated by WDFW and WSDOT as described in Chapter 12, Task 7.3.
Wolf populations in general need to be large enough to be genetically interconnected. This means the population must show measurable gene flow, not a few wandering wolves like the U.S. Fish and Wildlife Service insists constitute a metapopulation in the Rockies.	The recommended plan that genetic interconnectedness is important to recovery of Washington's wolf population. WDFW will monitor the population (Tasks 1.3.4 and 11.2) for levels of gene flow consistent with maintaining viable populations. A new genetic study (vonHoldt et al. 2010) indicates that adequate gene flow does exist between the three main recovery regions in Idaho, Montana, and Wyoming.
Genetic connectivity should be maintained by excluding isolated pockets of wolves from wolf population totals used for viability quotas.	As indicated in the recommended wolf plan, all successful breeding pairs in Washington will be counted towards downlisting and delisting requirements. The plan contains a task (Chapter 12, Task 7) to maintain and restore habitat connectivity for wolves. This combined with the dispersal abilities of wolves means that there would likely not be any isolated pockets of wolves in the state that would be genetically disconnected from the main population or populations in neighboring states or British Columbia.
WDFW should work with neighboring states to	Under current circumstances, it is unrealistic to believe that wildlife

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present Washington's recovery objectives for wolves as consideration for ceasing further public wolf hunts in those states until Washington's wolf population objectives are met.	authorities in Idaho and Montana would delay public hunting and wolf management activities until Washington meets its own wolf recovery goals. British Columbia also would not be likely to put new protections of wolves into effect simply to assist wolf recovery in Washington. Nevertheless, the recommended plan includes a task (Chapter 12, Task 10.1.2) to work with adjacent states and British Columbia to encourage maintenance of populations and habitat connectivity to support long-term viability of wolf populations in Washington. Future discussions and cooperation of this type could perhaps lead to a more regional approach to wolf conservation.
The maps in the plan are deceptive in not showing the waters of Puget Sound covering over half the state in a north-south axis, and largely decoupling the Pacific Coast Region from the rest of the state.	Several maps in the wolf plan are general in nature and show only county boundaries. These maps do not illustrate Puget Sound. Most Washington residents are familiar with the location of Puget Sound and understand that the waters of the Sound represent an impassable barrier to any wolf that might attempt to disperse westward.
Sufficient habitat connectivity already exists in northeastern Washington.	As described in Chapter 3, Section A, of the wolf plan, the study by Singleton et al. (2002) indicates that several potential barriers to wolf movements exist in northeastern Washington. These include the upper Columbia (Lake Roosevelt)-Pend Oreille valleys and the Okanogan Valley.
Large areas of core wolf habitat, such as found in Idaho, Montana, and Wyoming, are less available in Washington. The consequences of this as it relates to wolf recovery could use more scrutiny and discussion.	A statement of this type was added to the wolf plan indicating that Washington does not have the large amounts of high quality habitat for wolves (i.e., large blocks of public lands with low road density, high ungulate populations, and low livestock abundance) as present in Idaho, Montana, and Wyoming.
Wolf recovery and conservation depends primarily on providing sufficient wild ungulate prey to support a wolf population sufficiently large enough to adapt to changing environmental conditions. This basic assessment, from a purely biological perspective, is missing from the plan.	The wolf plan acknowledges that sufficient wild ungulate prey is important for a viable wolf population in the state. The WDFW manages for healthy ungulate populations through habitat improvement, harvest management, and reduction of illegal harvest consistent with game management plans.
Washington does not have enough wild country and prey available to support any of the recommended number of breeding pairs. The state is too developed and fragmented by humans, and too large of human population. This will result in high levels of conflicts with livestock and people.	Habitat modeling information presented in Chapter 3, Section A, shows considerable habitat available for wolves in Washington. The four wolf habitat models referenced in the plan indicate an average of 38% of the state is potential wolf habitat. Washington lacks the extensive areas of highly suitable habitat that Idaho, Montana, and Wyoming have. Thus, Washington is not expected to support as many wolves as these states. Projections made in Chapter 14 suggest that wolf-human conflict levels through to the time of delisting will be lower than suggested in this comment.
There should be a discussion of how many breeding pairs or total wolves could be supported by suitable habitat in the state. The plan says that Washington currently has about 26,700 square miles of potentially suitable wolf habitat. At a density of 12-25 wolves/1000 square miles, this would yield a potential wolf population between 320 and 668 wolves.	WDFW estimated the potential biological carrying capacity for wolves in Washington by overlaying a circle representing a pack territory size of 360 sq mi (933 km <sup>2</sup> ) on a map of potential wolf habitat. Territory size used was based on the mean size of territories in Idaho and two packs in Washington. Amount of potential habitat was determined by the Maletzke model ( $\geq 50\%$ probability of occupancy, using the parameters of Oakleaf et al. 2006; Figure 5 in the plan). The analysis resulted in an estimate of 76 packs for the state. As wolf recovery continues, WDFW will use Washington-specific data to refine estimates of biological carrying capacity in the state.
The plan does not establish critical habitat for	This comment appears to be in reference to federal critical habitat

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wolves. This designation is required before there can be any translocation of a listed species.	for listed species. There is no federal critical habitat for wolves anywhere in the U.S.
Recommend that the remaining wild areas in Washington be preserved as "wilderness" to give wolves a better chance for survival.	Comment noted.
Because of potential connectivity barriers that will likely limit natural dispersal to much of the Southern Cascades and Northwest Coast recovery region, the plan should allow delisting by individual recovery regions so that management issues can be better addressed. This will prevent one or two regions with abundant wolves from having to wait until the entire statewide distribution goal is reached. This will also result in greater social tolerance for wolves for people living in those regions that are down-listed more quickly.	Species and subspecies of wildlife may be listed and delisted under Washington state law (WAC 232-12-297), but not subpopulations.
Support the 3 recovery regions currently proposed in the plan. The Southern Cascades and Northwest Coast Recovery Region should not be separated into 2 recovery regions.	Comment noted.
I support separating the current Southern Cascades and Northwest Coast Recovery Region into 2 recovery regions. This would create a separate Pacific Coast Recovery Region with its own recovery objectives. This region offers good habitat for wolves because of ample prey populations and relative isolation from humans. It is also ecologically distinct from the Southern Cascades.	Comment noted. This was Alternative 3 in the Draft EIS. This alternative was not selected in the Final EIS because the WDFW believes recovery in a significant portion of the range can be accomplished without a 4 <sup>th</sup> Pacific Coast recovery region.
Wolves should be fully restored to the wild areas of Washington, including the area identified as the Pacific Coast region recovery.	Comment noted.
Omission of a Pacific Coast Recovery Region from the delisting criteria is not consistent with meeting true recovery and restoration as required by Washington statute. The law requires that listed species must be restored to "all or a significant portion of their range".	Comment noted. This was Alternative 3 in the Draft EIS. This alternative was not selected in the Final EIS because the WDFW believes recovery in a significant portion of the range can be accomplished without a 4 <sup>th</sup> Pacific Coast recovery region.
I support wolf recovery in the Olympic National Park, but not southwest Washington or the southern Cascades.	Comment noted.
I support wolf recovery in the Olympic National Park.	Comment noted.
Oppose wolf recovery on the Olympic Peninsula, but believe that having wolves in eastern Washington and the Cascades is adequate.	Comment noted.
Wolf recovery on the Olympic Peninsula should not be considered because the majority of residents of the region voted "no" in a referendum on wolf reintroduction in the past.	Comment noted. While WDFW is aware of a series of town hall meetings conducted in 1998 on the Olympic Peninsula regarding wolf introduction, we are not aware of a referendum in the past.
The plan should have a separate recovery region for southeastern Washington. The Blue Mountains are ecologically distinct from	WDFW and the Wolf Working Group considered this option (see Appendix I) but decided to combine most of eastern Washington into a single recovery region to reduce management complexity.

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northeastern Washington and are not directly connected to dispersing wolves from Idaho.	
The plan should include only 1 recovery region (i.e., the entire state), not 3 or 4.	The designation of multiple recovery regions in the wolf plan was done to help ensure that there would be distribution throughout a "significant portion of [their] range" in the state per WAC 232-12-297.
WDFW should divide the state into reasonably sized wolf management units similar to existing game management units.	WDFW and the Wolf Working Group considered an option of having a larger number of recovery regions (see Appendix I) but decided that three regions would reduce management complexity.
The plan should provide information on the carrying capacity of each recovery region for wolves.	Information was added on the amount of potentially suitable habitat for wolves in each of the 3 recovery regions (see Table 3, Chapter 3) and the potential biological carrying capacity of the entire state for wolves (Chapter 3, Section B).
Support having wolves on public lands, but not on private lands.	Comment noted. As with other listed species, private lands have key roles to play in wolf recovery in Washington. Some of these include providing dispersal habitat between core habitats and providing seasonal habitat for ungulate prey. Wolf-related conflicts that occur on private lands can be addressed through the various management measures included in the recommended plan.
Given the uncertainty over whether Washington's wolf population will indeed be connected with populations in neighboring states and Canada, the number of wolves needed for ensuring recovery in Washington is impossible to determine at this time. Clearly additional research is needed to establish scientifically based conservation goals for wolves in the state. Instead of prematurely setting conservation goals through a negotiated stakeholder process, WDFW should work with research institutions to collect the needed information to determine the size of a long-term genetically sustainable wolf population for the state.	This approach of not providing specific numbers in the wolf plan's recovery objectives was considered early in the plan's development. However, it was rejected on the advice of all members of the Wolf Working Group, who preferred the inclusion of specific numbers (Appendix I), as in wolf recovery plans for other states. This greatly increases public understanding of the plan.
The plan does not provide a clear biological assessment of how many wolves are required to form a self-sustaining population in Washington, especially in isolation from other neighboring populations. What is needed is a clear, unbiased, wolf-focused analysis of how many wolves are needed, and then a clear, human-focused analysis of how this number can be obtained in Washington. A recommended approach to evaluating the size of a self-sustaining population may include the following: 1) conduct a population viability analysis (PVA) beginning with a minimum of 15 breeding pairs and a mid-winter population of 150 wolves as a population target in neighboring states, 2) use a spatially explicit population and habitat viability analysis (PHVA) for Washington to determine spatially where ungulate populations occur and therefore could support wolf packs, and 3) include in the spatially explicit analysis an assessment of where human needs on private lands occur, and where ungulate	New material was added to the recommended plan describing the results of a population model used to evaluate the long-term persistence of the plan's recovery objectives (Chapter 3, Section B; Appendix H). Peer and public review comments suggested that WDFW should conduct a population viability analysis to determine recovery levels, because of concern that a delisting goal of 15 successful breeding pairs was too low for achieving long-term recovery. Because the number 15 was selected as acceptable by most members of the wolf working group, WDFW decided it would first evaluate whether 15 was an adequate goal for delisting criteria. If not, WDFW would determine higher levels goals that may be necessary for achieving recovery. Results of the analysis suggested that with an initial population of 15 breeding pairs (which may represent an estimated range of 97-365 wolves), the population could persist for 50 years, and didn't fall below recovery objectives, as long as it was allowed to grow and was not limited. Other associated factors that reduced the risk to viability included robustness on the landscape (3 years), using successful breeding pairs as the measure, and distribution throughout three recovery regions in a significant portion of the species' historic range. If the population model assumptions are correct, WDFW

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<p>populations exist that support wolves, but would be in conflict with wolves. From these results, a socially tolerable plan to maintain a biologically sustainable wolf population could be provided. It is very important that this plan be presented as a compromise between the needs of wolves and those of people. The current, proposed plan does not indicate this well, nor does it show precisely where and how tradeoffs between population sustainability of wolves and human priorities (e.g., hunting, livestock production) are occurring.</p>	<p>believes that collectively, these factors would likely result in a self-sustaining wolf population. Higher recovery objectives were not believed to be necessary to achieve the purpose and need of the plan. In the future, if the population dynamics of wolves in Washington behave differently than those in the model assumptions, as stated in the wolf plan, WDFW may need to reevaluate whether the existing delisting goals remain sufficient.</p>
<p>The plan does not justify the use of 15 breeding pairs for 3 consecutive years as a viable wolf population and it indicates that proposed breeding pair numbers are based on compromise, not on science, which is unacceptable. The plan is contradictory in stating that 15 breeding pairs is below that thought needed for long-term persistence of an isolated population, yet later in the document it considers 15 breeding pairs to be minimal or barely adequate for population viability. If 15 breeding pairs was determined through political choice or compromise, then the plan should clearly state this and remove language stating that 15 breeding pairs represent a self-sustaining viable population. The plan should explicitly state how breeding pair numbers were established in light of recent research.</p>	<p>New material was added to the recommended plan describing the results of a population model used to evaluate the long-term persistence of the plan's recovery objectives (Chapter 3, Section B; Appendix H). Peer and public review comments suggested that WDFW should conduct a population viability analysis to determine recovery levels, because of concern that a delisting goal of 15 successful breeding pairs was too low for achieving long-term recovery. Because the number 15 was selected as acceptable by most members of the wolf working group, WDFW decided it would first evaluate whether 15 was an adequate goal for delisting criteria. If not, WDFW would determine higher levels goals that may be necessary for achieving recovery. Results of the analysis suggested that with an initial population of 15 breeding pairs (which may represent an estimated range of 97-365 wolves), the population could persist for 50 years, and didn't fall below recovery objectives, as long as it was allowed to grow and was not limited. Other associated factors that reduced the risk to viability included robustness on the landscape (3 years), using successful breeding pairs as the measure, and distribution throughout three recovery regions in a significant portion of the species' historic range. If the population model assumptions are correct, WDFW believes that collectively, these factors would likely result in a self-sustaining wolf population. Higher recovery objectives were not believed to be necessary to achieve the purpose and need of the plan. In the future, if the population dynamics of wolves in Washington behave differently than those in the model assumptions, as stated in the wolf plan, WDFW may need to reevaluate whether the existing delisting goals remain sufficient.</p>
<p>Washington regulation requires delisting decisions be made "solely on the basis of the biological status of the species being considered, based on the preponderance of scientific data available." WDFW's wolf plan violates delisting criteria established in state statute. In fact, the plan acknowledges the target of 15 breeding pairs is an accommodation between conservation and livestock interests.</p>	<p>New material was added to the recommended plan describing the results of a population model used to evaluate the long-term persistence of the plan's recovery objectives (Chapter 3, Section B; Appendix H). Peer and public review comments suggested that WDFW should conduct a population viability analysis to determine recovery levels, because of concern that a delisting goal of 15 successful breeding pairs was too low for achieving long-term recovery. Because the number 15 was selected as acceptable by most members of the wolf working group, WDFW decided it would first evaluate whether 15 was an adequate goal for delisting criteria. If not, WDFW would determine higher levels goals that may be necessary for achieving recovery. Results of the analysis suggested that with an initial population of 15 breeding pairs (which may represent an estimated range of 97-365 wolves), the</p>

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	<p>population could persist for 50 years, and didn't fall below recovery objectives, as long as it was allowed to grow and was not limited. Other associated factors that reduced the risk to viability included robustness on the landscape (3 years), using successful breeding pairs as the measure, and distribution throughout three recovery regions in a significant portion of the species' historic range. If the population model assumptions are correct, WDFW believes that collectively, these factors would likely result in a self-sustaining wolf population. Higher recovery objectives were not believed to be necessary to achieve the purpose and need of the plan. In the future, if the population dynamics of wolves in Washington behave differently than those in the model assumptions, as stated in the wolf plan, WDFW may need to reevaluate whether the existing delisting goals remain sufficient.</p>
<p>The number of breeding pairs required for delisting should be increased to ensure a viable wolf population. WDFW should err on the side of caution to account for various population threats, both human and natural (e.g., illegal killing, disease).</p> <p>The number of breeding pairs needed for delisting should be increased. A significant number of scientific reviewers believed that WDFW's numbers for delisting are too low, especially since the plan relies on natural migration areas outside the state for recovery. Breeding numbers should be based on the latest and relevant science, including possibly a population viability analysis (PVA).</p> <p>The 15 breeding pairs called for in the draft plan may translate into as few as 97 individuals. A population of less than 100 animals with 30 breeders results in an effective population size that is too small to be sustainable. A population that small is more under the influence of random genetic drift than it is under the action of natural selection, and therefore cannot be considered an evolutionary sustainable total population</p>	<p>New material was added to the recommended plan describing the results of a population model used to evaluate the long-term persistence of the plan's recovery objectives (Chapter 3, Section B; Appendix H). Peer and public review comments suggested that WDFW should conduct a population viability analysis to determine recovery levels, because of concern that a delisting goal of 15 successful breeding pairs was too low for achieving long-term recovery. Because the number 15 was selected as acceptable by most members of the wolf working group, WDFW decided it would first evaluate whether 15 was an adequate goal for delisting criteria. If not, WDFW would determine higher levels goals that may be necessary for achieving recovery. Results of the analysis suggested that with an initial population of 15 breeding pairs (which may represent an estimated range of 97-365 wolves), the population could persist for 50 years, and didn't fall below recovery objectives, as long as it was allowed to grow and was not limited. Other associated factors that reduced the risk to viability included robustness on the landscape (3 years), using successful breeding pairs as the measure, and distribution throughout three recovery regions in a significant portion of the species' historic range. If the population model assumptions are correct, WDFW believes that collectively, these factors would likely result in a self-sustaining wolf population. Higher recovery objectives were not believed to be necessary to achieve the purpose and need of the plan. In the future, if the population dynamics of wolves in Washington behave differently than those in the model assumptions, as stated in the wolf plan, WDFW may need to reevaluate whether the existing delisting goals remain sufficient.</p>
<p>The plan's recommended breeding pair numbers need to be increased to be consistent with federal recommendations for Idaho, Montana, and Wyoming combined.</p> <p>The plan's recommended breeding pair numbers need to be decreased so they are consistent with federal recommendations for Idaho, Montana, and Wyoming</p>	<p>New material was added to the recommended plan describing the results of a population model used to evaluate the long-term persistence of the plan's recovery objectives (Chapter 3, Section B; Appendix H). Peer and public review comments suggested that WDFW should conduct a population viability analysis to determine recovery levels, because of concern that a delisting goal of 15 successful breeding pairs was too low for achieving long-term recovery. Because the number 15 was selected as acceptable by most members of the wolf working group, WDFW decided it would first evaluate whether 15 was an adequate goal for delisting</p>

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	<p>criteria. If not, WDFW would determine higher levels goals that may be necessary for achieving recovery. Results of the analysis suggested that with an initial population of 15 breeding pairs (which may represent an estimated range of 97-365 wolves), the population could persist for 50 years, and didn't fall below recovery objectives, as long as it was allowed to grow and was not limited. Other associated factors that reduced the risk to viability included robustness on the landscape (3 years), using successful breeding pairs as the measure, and distribution throughout three recovery regions in a significant portion of the species' historic range. If the population model assumptions are correct, WDFW believes that collectively, these factors would likely result in a self-sustaining wolf population. Higher recovery objectives were not believed to be necessary to achieve the purpose and need of the plan. In the future, if the population dynamics of wolves in Washington behave differently than those in the model assumptions, as stated in the wolf plan, WDFW may need to reevaluate whether the existing delisting goals remain sufficient.</p>
<p>U.S. Fish and Wildlife Service's recovery goals of 30 breeding pairs of wolves and 300 individuals as a viable population for Idaho, Montana, and Wyoming combined has been harshly criticized as being an inadequate population target. WDFW's plan target of 15 breeding pairs for delisting is an even smaller size that clearly does not ensure a long-term sustainable population. This means that WDFW's plan fails to meet Washington state's law for achieving long-term sustainability.</p>	<p>New material was added to the recommended plan describing the results of a population model used to evaluate the long-term persistence of the plan's recovery objectives (Chapter 3, Section B; Appendix H). Peer and public review comments suggested that WDFW should conduct a population viability analysis to determine recovery levels, because of concern that a delisting goal of 15 successful breeding pairs was too low for achieving long-term recovery. Because the number 15 was selected as acceptable by most members of the wolf working group, WDFW decided it would first evaluate whether 15 was an adequate goal for delisting criteria. If not, WDFW would determine higher levels goals that may be necessary for achieving recovery. Results of the analysis suggested that with an initial population of 15 breeding pairs (which may represent an estimated range of 97-365 wolves), the population could persist for 50 years, and didn't fall below recovery objectives, as long as it was allowed to grow and was not limited. Other associated factors that reduced the risk to viability included robustness on the landscape (3 years), using successful breeding pairs as the measure, and distribution throughout three recovery regions in a significant portion of the species' historic range. If the population model assumptions are correct, WDFW believes that collectively, these factors would likely result in a self-sustaining wolf population. Higher recovery objectives were not believed to be necessary to achieve the purpose and need of the plan. In the future, if the population dynamics of wolves in Washington behave differently than those in the model assumptions, as stated in the wolf plan, WDFW may need to reevaluate whether the existing delisting goals remain sufficient.</p>
<p>Objectives for downlisting and delisting could include both a total population size as well as minimum numbers and distribution of breeding packs for recovery regions. For state delisting, 300+ wolves for 3 years with the following distribution: 2 breeding packs of 4+ wolves in</p>	<p>WDFW decided not to follow this recommendation. The recommended wolf plan continues to use only numbers of breeding pairs (in addition to requirements of sufficient distribution over 3 consecutive years) in its downlisting and delisting objectives. Requiring that both breeding pair numbers and total wolf numbers be tracked would add too much</p>

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Eastern Washington, 2 breeding packs of 4+ wolves in the Northern Cascades, 5 breeding packs of 4+ wolves in Southern Cascades/NW Coast, and 6 breeding packs of 4+ wolves distributed in any of the 3 regions.	complexity to the agency's population monitoring. After delisting, the plan recommends (Chapter 12, Task 1.4) that consideration be given to shifting monitoring efforts to measurement of total numbers or packs.
Washington does not have large blocks of public land nor high ungulate densities, therefore wolf population densities will likely be relatively low (12-25/1000km <sup>2</sup> ). This estimate would result in about 200-250 wolves in the state. The plan indicates that about 500 wolves is considered viable for a population. How will the state accomplish a sustainable wolf population if the landscape will not support as many animals as hoped? How would WDFW justify proceeding with downlisting and delisting the wolf if it truly doesn't have a viable wolf population that is well-connected with neighboring wolf populations and exceeds generally accepted numbers of viability (500)? Given this, WDFW needs to proceed cautiously with delisting.	New material was added to the recommended plan describing the results of a population model used to evaluate the long-term persistence of the plan's recovery objectives (Chapter 3, Section B; Appendix H). Peer and public review comments suggested that WDFW should conduct a population viability analysis to determine recovery levels, because of concern that a delisting goal of 15 successful breeding pairs was too low for achieving long-term recovery. Because the number 15 was selected as acceptable by most members of the wolf working group, WDFW decided it would first evaluate whether 15 was an adequate goal for delisting criteria. If not, WDFW would determine higher levels goals that may be necessary for achieving recovery. Results of the analysis suggested that with an initial population of 15 breeding pairs (which may represent an estimated range of 97-365 wolves), the population could persist for 50 years, and didn't fall below recovery objectives, as long as it was allowed to grow and was not limited. Other associated factors that reduced the risk to viability included robustness on the landscape (3 years), using successful breeding pairs as the measure, and distribution throughout three recovery regions in a significant portion of the species' historic range. If the population model assumptions are correct, WDFW believes that collectively, these factors would likely result in a self-sustaining wolf population. Higher recovery objectives were not believed to be necessary to achieve the purpose and need of the plan. In the future, if the population dynamics of wolves in Washington behave differently than those in the model assumptions, as stated in the wolf plan, WDFW may need to reevaluate whether the existing delisting goals remain sufficient.
<p>WDFW should follow the population assessments used by the U.S. Fish and Wildlife Service (1994) and Wisconsin DNR (1999), which concluded that about 500 wolves are needed for a self-sustaining population.</p> <p>At least 50-100 breeding pairs are needed for delisting.</p> <p>Delisting should not occur until 50 breeding pairs of wolves are present.</p> <p>At least 50 breeding pairs per isolated region are needed to recover wolves in this state.</p> <p>WDFW should set recovery goals of 30 or more breeding pairs of wolves and these need to represent a single connected population.</p> <p>The plan's current recovery objectives are not</p>	<p>New material was added to the recommended plan describing the results of a population model used to evaluate the long-term persistence of the plan's recovery objectives (Chapter 3, Section B; Appendix H). Peer and public review comments suggested that WDFW should conduct a population viability analysis to determine recovery levels, because of concern that a delisting goal of 15 successful breeding pairs was too low for achieving long-term recovery. Because the number 15 was selected as acceptable by most members of the wolf working group, WDFW decided it would first evaluate whether 15 was an adequate goal for delisting criteria. If not, WDFW would determine higher levels goals that may be necessary for achieving recovery. Results of the analysis suggested that with an initial population of 15 breeding pairs (which may represent an estimated range of 97-365 wolves), the population could persist for 50 years, and didn't fall below recovery objectives, as long as it was allowed to grow and was not limited. Other associated factors that reduced the risk to viability included robustness on the landscape (3 years), using successful breeding pairs as the measure, and distribution throughout three recovery regions in a significant portion of the species' historic</p>

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<p>sufficient. Population viability analysis work in Wisconsin suggests 300 individuals are needed for an isolated, self-sustaining population. Therefore, a population viability analysis should help with identifying a self-sustaining population, but a reasonable estimate may be between 150 and 300 wolves together with a stipulation that 15 breeding pairs be geographically distributed and stable over time</p> <p>The number of breeding pairs required for delisting should be increased to more than 15 breeding pairs, which represents an effective breeding population size of just 30 individuals. Current management policies in neighboring states and Canada emphasize lethal control, which will limit immigration into Washington. WDFW's plan should therefore produce a population that can survive even if it is isolated and not part of a larger metapopulation.</p>	<p>range. If the population model assumptions are correct, WDFW believes that collectively, these factors would likely result in a self-sustaining wolf population. Higher recovery objectives were not believed to be necessary to achieve the purpose and need of the plan. In the future, if the population dynamics of wolves in Washington behave differently than those in the model assumptions, as stated in the wolf plan, WDFW may need to reevaluate whether the existing delisting goals remain sufficient.</p>
<p>The 150 wolves cited as a minimum for wolf recovery in western Washington is a number based on politics, not biology. To avoid genetic problems of inbreeding and malformations, a recovered wolf population needs to number in the thousands, not hundreds; this concept of genetic viability is well-established in the scientific literature.</p>	<p>This first sentence in this comment is incorrect. The draft wolf plan does not require that western Washington have a minimum of 150 wolves to achieve delisting. Instead, for delisting, it requires that 15 successful breeding pairs be established for 3 consecutive years, with specific numbers of pairs spread across 3 recovery regions in Washington. This number of breeding pairs is estimated to represent a range of about 97-361 wolves. The population model used by WDFW indicates that 15 breeding pairs represent a viable population for Washington as long as numbers are allowed to continue growing and are not capped at 15 breeding pairs (Chapter 3, Section B; Appendix H).</p>
<p>Support greater than 15 breeding pairs of wolves per county.</p>	<p>Given the generally small size of Washington's counties (which range in size from 175 to 5,268 sq mi; average = 1,681 sq mi) and the large home range sizes of wolf packs (about 200-400 sq mi on average in Idaho, Montana, and Wyoming), this goal is biologically unattainable.</p>
<p>Wolves should be recovered to their historical numbers.</p>	<p>This goal is unattainable because of the many changes that have occurred in Washington's landscape during the past 150 years.</p>
<p>Delisting should not be considered until genetic diversity, genetic connectivity, and genetically viable population goals have been met for at least 5 years.</p> <p>Proof of genetic diversity should not be required to achieve wolf recovery. This is a long-term issue for future generations to consider.</p>	<p>Genetic criteria are not part of the downlisting and delisting criteria used in the recommended wolf plan. For delisting, the plan only requires that 15 successful breeding pairs be established for 3 consecutive years, with specific numbers of pairs spread across 3 recovery regions in Washington. The population model used by WDFW indicates that 15 breeding pairs represent a viable population for the state as long as numbers are allowed to continue growing and are not capped at 15 breeding pairs (Chapter 3, Section B; Appendix H). If the population is connected to wolf populations in neighboring states and British Columbia, then there should be sufficient gene flow to maintain viability. Continued monitoring of genetic diversity over time will reveal whether the population contains sufficient genetic variation. This will inform future management of the population.</p>
<p>Recommend using the generation time of wolves</p>	<p>Generation time has not been well described for wolves. One</p>

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rather than the period of 3 consecutive years for recovery targets.	recent report (vonHoldt et al. 2008) documented it to be 4.16 years at Yellowstone National Park. Populations outside of protected areas like Yellowstone probably have smaller generation times because wolves in them typically experience higher rates of human-related mortality. Variation of this type may make generation time an impractical measure to use in Washington's wolf recovery objectives.
At least half of breeding pair numbers should be in areas where they are protected from all hunting pressure and prey populations are not hunted.	The issue of whether or not to hunt wolves in Washington and how hunting might be managed will be determined by the Fish and Wildlife Commission after delisting occurs. As noted in the recommended wolf plan, WDFW will not close the public hunting of ungulates in some areas to benefit wolf recovery.
Support WDFW not placing an upper limit on the number of wolves allowed to live in Washington, unless serious conflicts arise due to high wolf population densities.	The population delisting objectives presented in the wolf plan are not intended to represent a population size limit (or "cap") at which the population would be managed (see Chapter 3, Section B). One reason for not managing the population at the delisting level is that any decline in numbers through natural fluctuation or other reasons could trigger the need for relisting.
It appears that Washington has the habitat to sustain more than 15 breeding pairs (see Figures 4-7 of the draft plan). Would WDFW allow more than 15 breeding pairs to exist in the state, which would help enhance viability?	The population delisting objectives presented in the wolf plan are not intended to represent a population size limit (or "cap") at which the population will be managed (see Chapter 3, Section B). One reason for not managing the population at the delisting level is that any decline in numbers through natural fluctuation could trigger the need for relisting. Management of wolves after delisting will be determined by the Fish and Wildlife Commission and could include the establishment of population goals for wolves in Washington. It is impossible to forecast what these goals might be set at. WDFW believes that a population level above 15 breeding pairs would enhance the population's viability.
If pack size in Washington is small (about 5 animals/pack), will WDFW consider revamping its 15 breeding pairs as the delisting number and consider more packs and pairs to reach a sustainable population size?	This scenario of small pack size (about 5 wolves/pack) is unlikely to occur among all of Washington's successful breeding pairs of wolves. Pack size will likely be more variable based on local differences in prey availability and mortality rates. The Diamond Pack numbered 12 members in 2010, indicating that Washington will likely be able to sustain some larger packs. Once approved by the Fish and Wildlife Commission, the delisting requirements for wolves are very unlikely to change in the near future. However, if poor viability of the population were demonstrated in the more distant future, then delisting criteria might be reevaluated.
If pack size in Washington is small (about 5 animals/pack), does WDFW have a plan to augment small packs, such as using cross-fostering of pups into existing packs?	Pack augmentation is not included as a management technique in the wolf plan and WDFW does not believe that it would be necessary. To WDFW's knowledge, this type of management has never been used to enhance wolf populations in the wild.
The delisting process should begin prior to reaching the 15 pair target (e.g., at 8-12 pairs) and the 3 consecutive year requirement should be reduced or eliminated. These measures will allow wolves to be immediately delisted when the 15 pair target is reached and will avoid having wolf numbers far exceed the target while WDFW's long review process takes place. Potential lawsuits (as seen in other states) will extend the delisting review period even further. Wolf populations in neighboring states have increased 24% per year	The requirement that breeding pair targets for downlisting and delisting be met for 3 consecutive years is an important part of the recovery criteria in the wolf plan and ensures that wolf numbers will be maintained over time. Given the lower quality of habitat for wolves in Washington, as compared to Idaho, Montana and Wyoming, it is uncertain that wolves will increase at a similar high rate in Washington. Table 4, which projects potential wolf numbers in Washington when 6, 12, and 15 successful breeding pairs are present, already incorporates the likelihood that additional wolf packs will be present in the population. WDFW might initiate the delisting process sometime before the full 3-year

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(pre-public hunting) and will likely increase at similar rates in Washington. Furthermore, there will likely be additional unconfirmed wolf packs present at the time of delisting, which means that wolf populations will be greater than the 15 confirmed pairs.	requirement is reached, but would not do so with only 8-12 breeding pairs present.
The requirement that 5 pairs be present in the Southern Cascades and Northwest Coast Recovery Region for downlisting to state sensitive status will take many years to achieve and will result in far too many wolves becoming established in Eastern Washington and the Northern Cascades Recovery Regions before management is allowed.	If wolves fail to naturally disperse to the Southern Cascades and Northwest Coast Recovery Region, translocation of wolves to the region could be conducted (see Chapter 3, Section B) from other recovery regions that have exceeded their delisting targets. Once present in the Southern Cascades and Northwest Coast Recovery Region, wolf numbers will likely grow quickly because of the high prey abundance present there. Management of wolves to address conflicts is allowed in each recovery region during all listed phases under the wolf plan. The plan outlines a variety of options to address potential conflicts (Chapter 4, Section E, conflicts with livestock; Chapter 5, Section F, conflicts with wild ungulates) regardless of population size and distribution within the state.
The wolf population should be limited (or "capped") at the delisting level with all excess wolves removed from the population. This will minimize damage to livestock and game populations.	As stated in the recommended plan, WDFW will not place a size limit (or "cap") on the state's wolf population. Population modeling suggests a very high likelihood of the population falling below the delisting requirement if it was capped at 15 successful breeding pairs (Chapter 3, Section B; Appendix H), which would then require relisting. The plan outlines a variety of options to reduce potential conflicts (see Chapter 4, Section E, for conflicts with livestock; see Chapter 5, Section F, for conflicts with wild ungulates) while wolves are listed. Management of wolves after delisting will be determined by a separate public process.
I believe Washington could support 12 wolf packs.	Population modeling presented in the recommended plan suggests that the state has the habitat to support substantially higher numbers of wolves (more than 50 packs; Appendix H).
<p>Recommend maximum of 3 breeding pairs to downlist to threatened, 6 breeding pairs to downlist to sensitive, and 9 pairs to consider wolves for delisting.</p> <p>Delisting should occur at 8 breeding pairs unless adequate funding is available to address all wolf-related concerns.</p> <p>The state's wolf population should be capped at 8 breeding pairs, which represents a genetically viable population.</p>	WDFW believes that delisting targets of fewer than 15 breeding pairs would not result in a viable and self-sustaining wolf population. The 3 blind peer reviewers were asked to review a proposal for delisting at 8 breeding pairs. Two of the three said this number would not result in a viable, self-sustaining population of wolves. Both believed that the number of successful breeding pairs needed to achieve delisting should be higher and that even the current recommended plan fell below current scientific standards for sustainability and genetic viability. The third reviewer considered the plan's recovery objectives of 15 successful breeding pairs for 3 consecutive years to be reasonable for achieving a recovered and self-sustaining wolf population. Based on this information, the recommendations in this comment does not meet WDFW's mandate to preserve, protect, and perpetuate the native wildlife species of the state.
WDFW should err on the side of caution and begin with a small population (e.g., the 8 breeding pairs called for in the minority report, or 50 wolves total). Then, once an adequate amount of time has passed for further review and evaluation of conflicts, wolf numbers could be increased if few conflict situations exist.	WDFW does not take this incremental approach in the recovery of state listed species. WDFW's state recovery and management plans reflect population size and distribution requirements for establishing viable and self-sustaining populations of listed species. Evaluation of conflict levels is not part of this process.
Recommend downlisting to state sensitive status	WDFW believes that delisting targets of fewer than 15 breeding

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<p>when 6 pairs are present in the state for 2 consecutive years.</p> <p>Delisting should occur when 2 breeding pairs are verified in each recovery region.</p> <p>Delisting should occur at 3-6 breeding pairs.</p> <p>Support having a small wolf population in the state, but the current downlisting and delisting goals are too high.</p>	<p>pairs would not result in a viable and self-sustaining wolf population. Therefore the recommendation in this comment does not meet WDFW's mandate to preserve, protect, and perpetuate the native wildlife species of the state.</p>
<p>Wolves should be downlisted to state threatened status in eastern Washington now.</p>	<p>Comment noted.</p>
<p>I oppose any plan that calls for increased wolf numbers. Washington already has too many wolves.</p>	<p>Comment noted.</p>
<p>The Eastern Washington Recovery Region already has too many wolves and numbers should be controlled.</p>	<p>Comment noted.</p>
<p>The wolf plan needs to take a more conservative approach by reducing the wolf numbers required for delisting. The current plan is too aggressive and does not provide good balance between recovering wolves and minimizing livestock and ungulate impacts. Having more reasonable (i.e., lower) population recovery goals may also help WDFW obtain support from hunters and outdoor enthusiasts, and help prevent illegal harvest.</p>	<p>Per WAC 232-12-297, recovery targets used by WDFW must be supported by science and result in a healthy, self-sustaining population. Population modeling conducted by WDFW found the delisting targets of 15 successful breeding pairs to be adequate and capable of persisting on the landscape as long as the population is allowed to increase and is not held at that number (Chapter 3, Section B; Appendix H). The 3 blind peer reviewers were asked to review a delisting proposal with lower numbers (i.e., 8 breeding pairs). Two of the three said 8 pairs would not result in a viable, self-sustaining population of wolves. Both believed that the number of successful breeding pairs needed to achieve delisting should be higher and that even the current recommended plan fell below current scientific standards for sustainability and genetic viability. The third reviewer considered the plan's recovery objectives of 15 successful breeding pairs for 3 consecutive years to be reasonable for achieving a recovered and self-sustaining wolf population. Based on this information, the recommendations in this comment to take a lower and more conservative approach to delisting does not meet WDFW's legal mandate with respect to recovering listed species.</p>
<p>Support a process where if breeding numbers are found to be too large (i.e., there are too many conflicts involving wolves), then breeding pair numbers can be reduced at a later date.</p>	<p>WDFW believes that a delisting target of 15 breeding pairs is necessary for a viable and self-sustaining wolf population in Washington. While wolves are listed, the recommended plan identifies a variety of management options to address and reduce wolf-related conflicts (see Chapter 4, Section E, for conflicts with livestock; see Chapter 5, Section F, for conflicts with wild ungulates). The plan allows for lethal control of wolves and packs that are repeatedly involved in livestock conflicts, which could temporarily reduce breeding numbers.</p>
<p>The plan allows too many wolves in the Southern Cascades/Northwest Coast Recovery Region. Targets for each region should be the same.</p>	<p>In the recommended plan, each of the three recovery regions has similar breeding pair numbers for delisting: 5 in Eastern Washington; 4 in the Northern Cascades; and 6 in the Southern Cascades/Northwest Coast region. The three recovery regions vary in the amount of suitable habitat and prey available to support wolves. The Southern Cascades/Northwest Coast Recovery</p>

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	Region has the largest amount of public land, greatest elk abundance, and a greater likelihood of reduced wolf-livestock conflicts. These factors would potentially make this region a key contributor to achieving a viable, self-sustaining wolf population in the state. It could also potentially act as a source of dispersing wolves to other areas of the state. For these reasons, recovery objectives are set higher for this region.
Restoring wolves to historical levels is an absurd concept given current human population pressures on the land.	The plan does not call for restoring wolves to historical levels; as stated in Chapter 1 of the final plan, this is not an attainable goal because of the broad landscape changes that have occurred in the state during the past 150 years. It was an alternative that was not considered in the Draft EIS.
The language used in the conservation/recovery objectives states that there must be "at least" a certain number of breeding pairs per recovery region to meet downlisting and delisting criteria. The language "at least" should be removed.	This was removed in the recommended plan.
Support a regionally-based population target for delisting criteria. There isn't a need for Oregon, Idaho, Montana, and Washington to each have self-sustaining wolf populations.	Comment noted. The regional status of wolves is outside the scope of the state plan. The wolf is listed as endangered under state law and requires a state recovery plan that establishes downlisting and delisting population targets for a healthy, self-sustaining population.
Wolves in Montana, Wyoming and Idaho have all recovered to the point of over-population, which shows that wolves do not need help from humans to be successful. Washington already has a sufficient number of breeding pairs of wolves to indicate that the population will be able to recover on its own.	Wolf recovery in Idaho, Montana, and Wyoming was facilitated by reintroductions and the protections given to the species under the federal Endangered Species Act. In Washington, wolves are dispersing naturally into the state and there are no reintroductions. The primary conservation efforts for wolves (as described in the recommended plan) are protection from human-caused mortality and managing conflicts as they occur. The plan also establishes recovery objectives for downlisting and delisting the species.
Recommend that WDFW protect only those wolves coming in from British Columbia and northern Idaho, which are more like the original strain of wolf historically present in Washington.	<p>All wolves dispersing into and establishing in Washington are protected under state law.</p> <p>This comment implies that the reintroduced wolves now present across most of Idaho, Montana, and Wyoming are different than the wolves that occurred historically in these states and Washington. This belief is erroneous for several reasons. First, examination of historical and recent wolf specimens from throughout North America indicates all wolves occurring in the Canadian and northern U.S. Rockies, interior B.C., Northwest Territories, and nearly all of Alaska are genetically and morphologically similar and belong to a single subspecies (<i>Canis lupus occidentalis</i>). Weights of wolves harvested in the 2009 hunting seasons in Idaho (ave weight = 101 lbs; max weight = 130 lbs) and Montana (ave weight = 97 lbs; max weight = 117 lbs) are similar to the sizes of the original wolves that occurred in these states in the 1800s and early 1900s. Second, radio-tracking data shows that wolves dispersing from southeastern B.C. and southwestern Alberta mix with wolves from Idaho and Montana and with wolves from farther north in B.C. and Alberta near the sources of the wolves used in the reintroductions to Idaho, Montana, and Wyoming in the mid-1990s. When combined with recent genetic research (vonHoldt et al. 2010) that reveals considerable genetic mixing among wolf populations in Idaho, Montana, and Wyoming,</p>

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	this information shows that wolves form a single population across the Rocky Mountains of the northern U.S. and southern Canada. Third, recent genetic research (vonHoldt et al. 2010) involving hundreds of wolves sampled from Idaho, Montana, and Wyoming in the 1990s and 2000s found no evidence of a remnant native population of wolves that differed genetically from the reintroduced wolves.
WDFW should use total wolf numbers in the plan's recovery objectives, rather than numbers of successful breeding pairs. Successful breeding pairs can be difficult to measure, especially in heavily forested regions. It may be easier to count the number of wolf breeding packs of 4 or more wolves in mid-winter when track counts in snow can be conducted, instead of the number of successful breeding pairs at the end of December, as currently stipulated in the plan.	The recommended plan retains the use of successful breeding pairs (a male and female with 2 or more pups that survive to Dec. 31) in its recovery objectives rather than total number of wolves. While it can be time consuming to determine if 2 or more pups survive to the end of the year, number of successful breeding pairs is a better indication of a viable, self-sustaining population if it can be determined if recruitment is occurring. This is the standard measure used in wolf recovery in the northern Rocky Mountains.
Rather than using numbers of successful breeding pairs as recovery criteria, numbers of "large" packs (i.e., packs with 6 or more members that have successfully bred for a calendar year) should be used instead. Large packs provide higher pup survival rates and have greater capacity for creating new packs.	The recommended plan retains the use of successful breeding pairs (a male and female with 2 or more pups that survive to Dec. 31) in its recovery objectives rather than number of large packs. Number of successful breeding pairs is the standard measure used in wolf recovery in the northern Rocky Mountains.
Why does the plan rush to delist wolves? This appears to be true so that wolves can be killed immediately by hunters and livestock operators.	Wolves will be delisted in Washington based solely on the biological status of the species (WAC 232-12-297). The delisting criteria in the recommended wolf plan are believed to represent a healthy, self-sustaining population throughout a significant portion of the historical range in the state.
How do we know that WDFW has accurately estimated the number of wolves in the state, rather than giving the public a rough estimate?	WDFW provides the public with the most accurate wolf numbers currently known to occur in the state. Comprehensive population monitoring is an essential part of wolf conservation and management in Washington (see Chapter 12, Task 1, of the wolf plan) and will be a high priority of WDFW while wolves remain state listed.
WDFW's delisting requirements are not clear in this plan.	WDFW believes that the delisting requirements are clearly presented in the wolf plan (see Chapter 3, Section B) and final environmental impact analysis.
Requirements needed to meet federal delisting are not clear in this plan.	There are no federal delisting criteria for wolves in Washington; to date, the USFWS does not have a recovery plan for wolves in Washington. The relationship between state and federal listing and delisting are clarified in the final recommended plan.
Are the 15 breeding pairs called for in the plan in addition to the 6-8 breeding pairs already present in the state?	Successful breeding pairs currently known to exist in Washington would be counted toward the delisting recovery objective of 15 successful breeding pairs. As of December 2010, there was only one confirmed successful breeding pair of wolves known in the state.
The plan is unclear about whether a target of 15 breeding pairs must be established within the Southern Cascades/Northwest Coast Region.	The 15 breeding pairs required for delisting are distributed among the 3 recovery regions. In the final recommended plan, 6 of the 15 breeding pairs would be needed in the Southern Cascades and Northwest Coast Region.
The plan does not provide enough information about how many wolves there might be when 15 breeding pairs are present in Washington.	Estimates of what range of numbers might be represented by 15 breeding pairs are presented in Table 4 of the recommended plan.

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Projected wolf numbers shown in Table 3 are a deliberate distortion of the truth.	WDFW believes that the table (now Table 4 in the recommended plan) accurately projects the range of wolf numbers that may occur in the state when 6, 12, and 15 breeding pairs are present.
Support the use of translocation to speed the recovery of wolves in Washington.	Comment noted.
Support the translocation of wolves to primary locations such as the Olympic Peninsula, Mt. St. Helens, Mt. Rainier area, the Dark Divide area of Gifford Pinchot National Forest, or other locations that offer large blocks of public land, good prey for wolves, and lower risk for conflicts.	Comment noted.
Believe that translocation should only be used as a last possible resort because of the complicated social and biological issues involved with its use.	The final recommended plan notes that natural dispersal is preferred, and that translocation would be a tool available if wolves fail to reach a recovery region through natural dispersal. Any proposed translocation would require a separate public EIS process.
Support translocation of wolves statewide so that all parts of Washington share in the "burden" of having wolves.	Comment noted.
Oppose any translocation, reintroduction, release, or placement of wolves in Washington, including the Olympic Peninsula.	Comment noted.
Oppose translocation because wolves are already becoming established in the state through natural dispersal. This will save money and avoid public acrimony. Public acceptance of wolves will be greater if wolves are allowed to naturally disperse through the state rather than being translocated to new locations.	Comment noted.
Oppose translocation because it would result in greater state and federal regulatory control over land use and natural resource management decision-making.	With the exception of some temporary area closures near den sites in national parks only, there have been no restrictions on grazing methods, road use, timber management and logging, mining, recreation, public access, or other activities due to the presence of wolves. Restrictions on human development and other land use practices have not been necessary to achieve wolf recovery in Idaho, Montana, and Wyoming.
Oppose translocation as an artificial means to meet recovery goals by establishing small isolated wolf populations that would be difficult to maintain after delisting.	The final recommended plan notes that natural dispersal is preferred, and that translocation would be a tool available if wolves fail to reach a recovery region through natural dispersal. The purpose of a translocation, if it occurred, would be to establish a population that would be linked to other populations and not isolated. Any proposed translocation would require a separate public EIS process, which would include a feasibility study to address factors such as connectivity or isolation.
Oppose translocation based on the high cost.	Comment noted.
Eastern Washington livestock operators may favor translocation, but western Washington livestock operators do not.	Comment noted.
The plan should include the potential negative aspects of translocations. These could include less public support for wolf recovery because the wolves were artificially brought to the region, greater agency blame if translocated wolves cause problems, translocated wolves suffer higher	Many of these concerns are about translocation are correct, but none were mentioned in the recommended wolf plan. These concerns are some of the reasons why the plan notes that natural dispersal is preferred for achieving wolf recovery in Washington, and why the plan does not recommend immediate implementation of translocation. Any proposed translocation would require a

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mortality, and translocated wolves may display erratic dispersal behavior and move into less desired areas, and will be costly to plan and conduct translocations, including monitoring of individuals.	separate public EIS process. This would include a feasibility study that examines many facets of translocation, including these concerns.
The plan needs more detail on conducting translocations, including time and funding schedules, type of release (hard vs. soft), numbers, methods to enhance genetic diversity, monitoring, etc. WDFW should designate a specific time interval for initiating translocations (i.e., how long will WDFW wait before planning and conducting translocations in state?).	The final recommended plan notes that natural dispersal is preferred, and that translocation would be a tool available if wolves fail to reach a recovery region through natural dispersal. Any proposed translocation would require a separate public EIS process. This would include a feasibility study and an implementation plan, which would contain details on conducting a translocation. It is premature at this time to provide details on conducting a translocation – these would be developed in the future if translocation were proposed.
Before translocations are conducted, a genetic study should be conducted to determine if wolves in eastern Washington are distinct from wolves that historically occurred in western Washington, and if so how this information should inform translocations. Ideally, it is important to maintain genetic diversity and unique populations when conducting translocations.	A statement has been added to Chapter 12, Task 3.3, of the recommended plan regarding genetic considerations of any translocations. The implementation plan to conduct translocations would address genetic aspects of moving wolves, including appropriate source populations.
Translocations should be postponed until a comprehensive feasibility study is conducted.	There are no translocations proposed. The final recommended plan notes that natural dispersal is preferred, and that translocation would be a tool available if wolves fail to reach a recovery region through natural dispersal. Any proposed translocation would require a separate public EIS process. This would include a feasibility study and an implementation plan, which would contain details on conducting a translocation (Chapter 3, Section B; Chapter 12, Tasks 3.2 and 3.3).
Concern that translocations will result in excessive numbers of wolves being removed from one or more recovery regions before numbers in those regions are large enough to sustain removals. This could hinder recovery in those regions and interfere with natural dispersal. WDFW should set the trigger for evaluating translocation at 2 regions exceeding their recovery objectives and should include some of the 6 "floating" breeding pairs required for delisting.	<p>Criteria in the recommended plan for translocation are that wolves would only be removed from a region if population numbers within the region exceeded delisting objectives and removal would not jeopardize the region's population by causing it to fall below delisting objectives (Chapter 3, Section B).</p> <p>Recovery objectives in the recommended plan no longer have unassigned breeding pairs.</p>
Translocation should not be viewed as a replacement for protecting habitat connectivity. Translocation should be conducted no matter the political implications.	WDFW does not view translocation as a replacement for ensuring habitat connectivity for wolves. The wolf plan includes a specific task (Chapter 12, Task 7) that addresses the importance of maintaining and restoring habitat connectivity for wolves.
The plan recommends translocation "if needed" but never defines the term "if needed". Similarly, the plan says that "translocation would be used if wolves failed to reach one or more recovery regions through natural dispersal".	Translocation will be deemed necessary if wolves are failing to successfully disperse into each recovery region and establish successful breeding pairs.
Translocation of wolves to the western two-thirds of the state will place these animals under federal jurisdiction through the federal Endangered Species Act. We suggest that these populations be classified as "non-essential experimental	Because wolves remain federally listed in the western two-thirds of Washington, any translocation of wolves to this region will require approval by the U.S. Fish and Wildlife Service. The Service has previously stated that wolf packs that become established in this part of the state will have full protection under the federal

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population" under Section 10(j) of the Endangered Species Act. This would allow for appropriate management of conflicts involving translocated populations.	Endangered Species Act and will not be designated as a "non-essential experimental population".
Private property owners should have a voice in what is put on their property.	Large blocks of public land with abundant prey away from livestock operations will be the best places for releasing translocated wolves. Any proposed translocation would require a public EIS process, which would give the public an opportunity to comment on the proposal. WDFW would very likely not consider translocating wolves to private land and would never do so without landowner consent.
Translocation should be put to a public vote in the areas where it is proposed.	Any proposal to translocate wolves in Washington would go through a public EIS process (i.e., a National Environmental Policy Act review if it was proposed on federal lands or a SEPA review if on nonfederal lands). This would allow the public an opportunity to comment on the proposal.
Translocation and reintroduction are the same concepts. It's deceiving to portray them as different.	In the final recommended plan, the two terms have different meanings (see plan's Glossary). Reintroduction refers moving wolves into Washington from outside the state. Translocation refers to moving wolves from one area of Washington to another. As stated in Chapter 1, WDFW has ruled out any reintroductions because wolves are already dispersing naturally into the state. Translocation is a tool that could be used if wolves fail to disperse to a recovery region in the state, which could delay or prevent recovery and delisting of the species. Any such translocation proposal would be evaluated through a separate public EIS process.
WDFW should conduct translocations but not inform the public as to their location.	Any proposal to translocate wolves in Washington would go through a public EIS process (i.e., a National Environmental Policy Act review if it was proposed on federal lands or a State Environmental Policy Act [SEPA] review if on nonfederal lands). This would allow the public an opportunity to comment on the proposal. WDFW will not conduct translocation in secret.
Wolves should be translocated to city parks so that city people can experience them directly and watch their pets be attacked and eaten.	Comment noted.
All wolves in eastern Washington should be caught and translocated to western Washington.	Efforts to recover wolves in Washington will require wolf population targets to be met in all three recovery regions of the state.
Measures described in the wolf plan to mitigate genetic concerns by moving individual wolves violate the plan's own definition of population viability. Recovery objectives and strategies should be revised so that genetic concerns would be addressed without requiring that wolves be moved.	The recommended plan includes a task (Chapter 12, Task 1.5) for moving individual wolves within Washington for genetic purposes. If WDFW determines that certain wolf populations are isolated and analyses identify genetic problems developing, such as inbreeding depression, WDFW would use move single wolves to a problem area to increase genetic diversity of a local gene pool. This activity differs from translocation (see Chapter 12, Task 1.5) and would not require a public EIS process. The recommended plan contains a task (Chapter 12, Task 7) to maintain and restore habitat connectivity for wolves. This combined with the dispersal abilities of wolves means that populations with genetic concerns will likely not occur in Washington and that this task would not be needed.
The plan needs to address wolf management after delisting. It should provide greater detail on the	As described in Chapters 1 and 3 (Section C), the wolf plan identifies only the conservation and management needs of wolves

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management tools (e.g., hunting, trapping, and government hunters) that could be used to limit wolf numbers in Washington. Alternatively, full protection after delisting may be warranted if wolf numbers remain small enough that they cannot sustain public hunting.	while they are a state listed species. Achieving delisting of wolves could require a substantial period of time. After delisting occurs, conservation and management needs should be fully reevaluated using all pertinent information available at the time. This is far superior to attempting to predict the species' needs after delisting based on the limited information that is currently available for Washington.
Support the use of a broad public review process for determining whether or not to classify the wolf as a game species after delisting.	A proposal to reclassify the wolf as a game species following delisting would go through the Washington Fish and Wildlife Commission, which is a public process.
WDFW will benefit from review of post-delisting management of wolves in neighboring states and elsewhere.	Information from surrounding jurisdictions would undoubtedly be closely examined and evaluated by WDFW when it makes post-delisting decisions about wolf conservation and management in Washington.
Support public hunting (and perhaps trapping) of wolves after delisting. This may help build overall tolerance for wolves among hunters and the general public, will help decrease the costs of other types of management, will help lessen impacts on game populations and livestock, will generate funds for WDFW, and provide valuable data on the wolves themselves. To this end, hunting of wolves should be made a goal of the plan.	As described in Chapters 1 and 3 (Section C), the wolf plan identifies only the conservation and management needs of wolves while they are a state listed species. Decisions about instituting public hunting of wolves will be made after delisting through a separate public review process, as indicated in the plan. Hunting of wolves could produce multiple benefits as indicated in this comment.
Public hunting of wolves will have the added benefit of keeping wolves afraid of people. This will make them less bold in their behavior and will discourage them from inhabiting areas used by people.	As described in Chapters 1 and 3 (Section C), the wolf plan identifies only the conservation and management needs of wolves while they are a state listed species. Decisions about instituting public hunting of wolves will be made after delisting through a separate public review process, as indicated in the plan. Hunting of wolves could produce multiple benefits, one of which is noted in this comment.
Wolves should be managed like other game species. Furthermore, there is no other carnivore in Washington that kills livestock and game that is not controlled through regulated hunting.	Comment noted.
Regulated public wolf hunting alone will not curb the wolf population. This belief is supported by the papers of Mech (2001) and Adams et al. (2008). It may be necessary to use other methods, such as poisoning and aerial shooting, to keep wolves under control.	Much greater knowledge of the impacts of public hunting on wolf populations will be learned in Idaho and Montana as these states enact public wolf hunts in the future. This information would be used to inform decisions about public wolf hunting in Washington.
If hunting (and perhaps trapping) of wolves is allowed, it needs to be carefully managed to prevent abuses and restricted to specific locations where management of wolves is required.	As described in Chapters 1 and 3 (Section C), the wolf plan identifies only the conservation and management needs of wolves while they are a state listed species. Decisions about instituting public hunting of wolves will be made after delisting through a separate public review process, as indicated in the plan. However, any public hunting of wolves that is allowed in Washington would be carefully managed by WDFW.
Oppose wolf hunting immediately after delisting. WDFW should follow Minnesota's model of waiting 5 years after delisting before public hunting is allowed. WDFW should also establish a wolf population "buffer" of at least 30% above target levels set for state delisting before hunting is	As described in Chapters 1 and 3 (Section C), the wolf plan identifies only the conservation and management needs of wolves while they are a state listed species. Decisions about instituting public hunting of wolves will be made after delisting through a separate public review process, as indicated in the plan. Minnesota's decision to wait 5 years after delisting before allowing

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allowed.	hunting is one option that the Washington Fish and Wildlife Commission could consider. Under any public hunting of wolves that might be approved, WDFW would manage at harvest levels that would not jeopardize the wolf population or require it to be relisted.
If wolves become a game species after delisting, core habitat areas should be established on federal lands where hunting is not allowed. Wolf hunting should also not be allowed near the borders of national and state parks or wilderness areas.	As described in Chapters 1 and 3 (Section C), the wolf plan identifies only the conservation and management needs of wolves while they are a state listed species. Decisions about instituting public hunting of wolves will be made after delisting through a separate public review process, as indicated in the plan. Specific decisions about hunting areas, harvest levels and methods, season lengths, etc would be made after hunting was approved.
The plan says that local communities will benefit more from "eco-dollars" from wolf watching than hunting dollars. Therefore, WDFW should support wolf tourism by being very conservative in the hunting of wolves, if and when hunting occurs.	The wolf plan says only that "the economic gain from wolf tourism has the potential to offset or exceed the combined costs of livestock depredation and reduced hunting opportunities." As described in Chapters 1 and 3 (Section C), the wolf plan identifies only the conservation and management needs of wolves while they are a state listed species. Decisions about balancing public hunting of wolves with wolf-related tourism benefits will be made after delisting through a separate public review process, as indicated in the plan.
After delisting of wolves occurs, WDFW should ban the potential use of aerial hunting, trapping, poisons, and the use of motorized vehicles to kill wolves.	As described in Chapters 1 and 3 (Section C), the wolf plan identifies only the conservation and management needs of wolves while they are a state listed species. Decisions about approved methods for killing wolves will be made after delisting through a separate public review process, as indicated in the plan.
Oppose wolf hunting after delisting.	As described in Chapters 1 and 3 (Section C), the wolf plan identifies only the conservation and management needs of wolves while they are a state listed species. Decisions about instituting public hunting of wolves will be made after delisting through a separate public review process, as indicated in the plan.
Needs to be greater consideration of the impact that wolf hunting will have on pack structure and behavior.	As described in Chapters 1 and 3 (Section C), the wolf plan identifies only the conservation and management needs of wolves while they are a state listed species. Decisions about instituting public hunting of wolves will be made after delisting through a separate public review process, as indicated in the plan.
Would like landowner "preference tags" for hunting wolves as soon as hunting of wolves is approved.	As described in Chapters 1 and 3 (Section C), the wolf plan identifies only the conservation and management needs of wolves while they are a state listed species. Decisions about instituting public hunting of wolves will be made after delisting through a separate public review process, as indicated in the plan. Specific decisions about hunting areas, harvest levels and methods, season lengths, etc would be made after hunting was approved.
Suggest that when 4 breeding pairs are confirmed in the state, that WDFW form a committee to formulate the process and implementation of wolves as a game species.	WDFW will begin the state delisting process for wolves in a timely fashion at or near when state delisting criteria have been achieved. A review of potential game status could possibly begin at or about the same time or soon after.
WDFW should be able to remove all wolves above a minimum number with special permits issued for this activity.	As stated in Chapter 3, Section C, any wolf hunting program that might be established would manage the population at a viable and sustainable level rather than at an arbitrary number or "cap."
Because wolves in eastern Washington are federally delisted, they should be considered a game animal and hunted now, just as they were in Idaho and Montana in 2009.	Wolves remain a state listed species throughout Washington, including the eastern one-third of the state. Wolves will not be delisted under state law until they have met the delisting criteria specified in Chapter 3, Section B, of the recommended plan.

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	These include 15 successful breeding pairs for 3 consecutive years, with certain breeding pair numbers needed in each of 3 recovery regions. Current wolf numbers in Washington are far too low to support hunting. A separate public review process to consider wolf hunting will be necessary after wolves are delisted, as stipulated in Chapter 3, Section C.
The wolf plan denies that WDFW has authority to manage wolves and wolf hunting on lands owned by other agencies and private lands, but I thought that WDFW could manage wolf hunting the same way it does other species, that is by setting hunting seasons and species, sex/age groups that may be hunted. In fact, WDFW would appear to have authority to establish areas where no hunting of wolves or their prey could be allowed.	This comment is partially incorrect. The recommended plan does <u>not</u> state that WDFW lacks the authority to manage wolf hunting on lands owned by other agencies and private lands. However, the plan does note that WDFW has no or minimal legal authority to implement land use restrictions to benefit state listed species on lands owned by other agencies and private lands (see Chapter 8, Sections B and C). If wolves are reclassified as a game species after being federally and state delisted (see Chapter 3, Section C), WDFW would establish statewide management goals for the species, which could include a public hunting program. The details of such a program would need to be established, but would likely allow wolves to be hunted on both public and private lands where in regions of the state where a sustainable harvest could be conducted. Under a hunting program, some areas or regions may be closed to wolf hunting.
What is WDFW's strategy for dealing with anti-hunters when wolf numbers are out of control and we can't get wolf harvest implemented soon enough?	As described in Chapters 1 and 3 (Section C), the wolf plan identifies only the conservation and management needs of wolves while they are a state listed species. Decisions about instituting public hunting of wolves will be made after state delisting occurs. Any related implementation strategies related to wolf hunting are beyond the scope of this wolf plan.
It is not moral or responsible to manage with the intent to remove protections. If wolves recover well to their native habitat, we should celebrate that as the correct order of things and see the benefit to ecosystems and all of us instead of taking it as a sign that wolves can be hunted and shot by ranchers.	The goal of endangered species conservation is to recover species to the point that their populations are self-sustaining and no longer in need of special protection. For species that cause human conflicts, such as wolves, hunting and allowing greater use of lethal control by affected landowners might instill greater public tolerance and value for the species, thereby securing their long-term conservation.
Plans are already underway to start hunting wolves as indicated by a proposal made by members of the Wolf Working Group in May 2008.	This statement is incorrect, as indicated in the wolf plan (see Chapter 3, Section C).
How will WDFW determine that the wolf needs to be relisted? The current plan is ambiguous about the criteria to trigger relisting.	As described in Chapter 3, Section C, of the recommended plan, WDFW will continue to monitor the wolf population after delisting. If the population appears to be declining toward the minimum population objectives for delisting, WDFW will undertake a full review of the population's status and threats, and make a decision on whether relisting is appropriate.
<b>Chapter 4 – Wolf livestock conflicts</b>	
Washington pioneers eliminated wolves for good reason, which was to protect their livestock and families.	Comment noted.
The needs of livestock operators should not be a higher priority than wolves.	Given the generous compensation program for livestock depredation and the various non-lethal and lethal control measures of the recommended wolf plan, WDFW believes that wolf recovery can be accomplished without significant adverse impacts to the state's livestock industry.
Livelihoods of ranchers should receive greater	WDFW considers the values and needs of multiple stakeholder

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consideration than wolf recovery.	groups in the management of wildlife in the state. Two public attitude surveys conducted in 2008 and 2009 indicated that about 75% of Washington's citizens support the recovery of wolves, thus livestock owners cannot be the only stakeholder group considered as wolf recovery and management moves forward. Given the generous compensation program for livestock depredation and the lethal and non-lethal control measures of the recommended wolf plan, WDFW believes that wolf recovery can be accomplished without significant adverse impacts to the state's livestock industry.
Predators have a place but it isn't everywhere in the landscape. It's irrational to believe that Americans can preserve large predators, like wolves, in close proximity to humans given the high human population and impacts to the livelihoods of livestock owners.	As demonstrated in neighboring states, wolves are expected to re-establish themselves primarily in areas with adequate wild ungulate prey and few conflicts with people (i.e., primarily on public lands). Where wolves interact with livestock, the wolf plan allows for a number of non-lethal and lethal management options to address and reduce conflicts.
Ranchers should not have to bear the costs and problems of having wolves on their land.	Given the generous compensation program for livestock depredation and the lethal and non-lethal control measures of the recommended wolf plan, WDFW believes that wolf recovery can be accomplished without significant adverse costs to most livestock owners.
Livestock are our nation's food-source animals and cannot be taken for granted.	Given the generous compensation program for livestock depredation and the various non-lethal and lethal control measures of the recommended wolf plan, WDFW believes that wolf recovery can be accomplished without significant adverse impacts to the state's livestock industry.
As a rancher, I would rather go out of business than see one of my cows suffer the terror of a wolf attack.	Comment noted.
Wolf-related impacts to livestock will likely occur in Washington but should not be the primary focus in the wolf plan.	The recommended plan emphasizes both recovery and management of conflicts with wolves. Reducing conflicts is considered an important part of wolf recovery by preventing loss of public tolerance for the species.
There should be a balance between wildlife and farming/ranching. Wolves belong in Washington just as much as ranchers.	Re-establishment of a viable and self-sustaining wolf population in Washington will only occur if there is a fair balance between the conservation needs of wolves and the needs of the public. Given the generous compensation program for livestock depredation and the lethal and non-lethal control measures in the recommended wolf plan, WDFW believes that wolf recovery can be accomplished without significant adverse impacts to most livestock owners.
There has been an ongoing problem with wolves killing livestock north of Northport in Stevens County, which is not reported in the plan.	To date, WDFW is aware of only one incident of wolf depredation on livestock in Stevens County or the rest of Washington. This involved the loss of several calves near Northport in August 2007. This incident is now mentioned more prominently in Chapter 2, Section B, of the recommended plan. Any rancher in the state who believes he or she has experienced wolf depredation should report this to the U.S. Fish and Wildlife Service, WDFW, or USDA Wildlife Services.
There should be a discussion of how many wolf breeding pairs could be expected to have little or no interactions with livestock operations on both private and public lands.	This type of information is now featured more prominently in Chapter 4, Section D, and Chapter 14, Section B, of the draft wolf plan. Tables 8, 19, and 20 give projections of the number of cattle, sheep, and dog losses and their monetary value for four different population sizes of wolves in Washington. Wolf numbers between 50 and 100 animals should pose minimal threat to the vast majority

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	of the state's livestock owners. As wolf numbers become larger and more widely distributed, more producers are likely to experience financial impacts. Wolves are generally expected to settle and survive in areas of Washington with adequate ungulate prey and low human-related mortality, which will most likely be on public lands. However, projections of the specific locations that wolves will occupy and at what number cannot be made at this time. This means that estimates of wolf impacts to livestock operations on private and public lands are not possible.
A goal of the environmental community is to eliminate the viability of livestock grazing, and they are using wolf recovery at higher populations numbers as the tool to attain this goal.	The livestock industry is a vital component of the Washington economy and provides important open space and habitats that support a wide variety of wildlife, including deer and elk. Thus, WDFW has no intention of trying to reduce or eliminate this industry. As described in Chapter 4 of the wolf plan, the agency is committed to working with livestock owners to reduce and resolve conflicts with wolves through a variety of non-lethal and lethal approaches.
I think WDFW is using wolf recovery to eliminate cattle ranching in Washington just like it used spotted owl recovery to eliminate logging in the state.	The livestock industry is a vital component of the Washington economy and provides important open space and habitats that support a wide variety of wildlife, including deer and elk. Thus, WDFW has no intention of trying to reduce or eliminate this industry. As described in Chapter 4 of the wolf plan, the agency is committed to working with livestock owners to reduce and resolve conflicts with wolves through a variety of non-lethal and lethal approaches.
Washington Department of Natural Resources should be the lead agency for wolf management because of its far superior track record in working with private landowners and because of WDFW's poor record in dealing with wildlife damage issues.	WDFW is the state agency with the legal responsibility for managing wildlife throughout Washington, thus the Washington Department of Natural Resources cannot assume the lead role in wolf recovery and management.
Wolves will have a significant adverse impact on livestock.	Given the generous compensation program for livestock depredation and the various non-lethal and lethal control measures of the recommended wolf plan, WDFW believes that wolf recovery can be accomplished without significant adverse impacts to the state's livestock industry.
Ranchers exaggerate the numbers of livestock killed by wolves.	Numbers of confirmed livestock depredations by wolves in Idaho, Montana, and Wyoming are presented in Table 5 of the wolf plan. These figures represent minimum estimates of the number of livestock killed by wolves. Probable losses are not included and ranchers sometimes fail to locate carcasses, or do not do so soon enough to reliably determine the specific cause of death, thus true losses can be substantially higher than confirmed (see Chapter 4, Section A). Nevertheless, wolves still cause only a small percentage of the cattle and sheep losses resulting from all predators in Idaho, Montana, and Wyoming (see Chapter 4, Section A).
Vastly more livestock are lost annually to dogs, disease, weather, and other causes than to wolves. Wolves probably account for less than 1% of livestock losses per year in other states. The plan should provide more discussion on this topic.	This issue is discussed in Chapter 4, Section A, of the wolf plan. Wolf losses are far smaller in number than those from non-predator related causes (sickness, disease, birthing problems, and weather) in Idaho, Montana, and Wyoming, accounting for less than 0.1% of total cattle losses and 0.6% of total sheep losses. Among all predator-related sources of mortality, wolves account for 1.6% of cattle losses and 0.6% of sheep losses in these states.
The plan is thorough in describing the effects of	Comment noted.

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wolves on livestock.	
Wolves will reduce coyote numbers, which can benefit livestock operators through reduced depredation by this species.	As indicated in Chapter 6, Section A of the wolf plan, reestablishment of wolves has led to reductions in coyotes in some areas, like Yellowstone and Grand Teton National Parks, but not others. It remains unclear whether these same interactions will occur outside of protected areas, where wolf densities may be lower because of conflicts with humans. If these interactions should occur in Washington, they could potentially benefit some livestock producers, but this remains to be demonstrated. As indicated in Figure 12, coyotes are the most significant predator of livestock in neighboring states.
The plan says that wolves could reduce coyotes and cougars, which could result in fewer total depredations on livestock by predators, and therefore possibly benefit some ranchers. I disagree with this and do <u>not</u> believe that ranchers will benefit from the addition of any new predators.	As stated in Chapter 6, Section A, of the wolf plan, wolves could affect the abundance, distribution, and behavior of other predators in some areas. This could potentially reduce livestock depredations caused by other species in those locations, but whether this would actually occur or not and to what extent remains unknown.
I do not have fears that wolves will harm my livestock. I know that if there is adequate natural prey available, and my management is well thought out, my animals will not be in danger from wolves.	WDFW believes that greater use of proactive measures (i.e., modified husbandry practices and non-lethal deterrents) by ranchers can reduce wolf depredation on livestock.
Wolves will move to low elevations during winter as they follow wild ungulates, and therefore will come into conflict with livestock more frequently. In addition, wild ungulates will cause greater damage to agricultural crops.	Some wolf packs in Washington are expected to move to lower elevations during the late fall, winter, and spring as they follow wild ungulates. One of the state's packs (the Lookout Pack) has followed this pattern of movement. Chapter 4, Section A, of the wolf plan notes that wolf depredation on livestock in the northern U.S. occurs most frequently from March to October, when livestock spend more time under open-grazing conditions, calving is taking place, and wolf litters are being raised. This suggests that wolf-livestock conflicts from late fall to early spring will likely not be an important problem in Washington. Most livestock are kept under confined conditions during this time of year, which should enable livestock owners to enact stronger protective measures for their animals. Increased ungulate damage to agricultural crops resulting from wolf presence has not been widely reported at any time of the year in Idaho, Montana, and Wyoming, and therefore is also not expected to be an important problem in Washington.
The plan could include estimates of the number of livestock raised on public forest lands versus those occurring on private pasture land. This information would be helpful in assessing the potential impacts of control measures on wolf populations due to conflicts between wolves and livestock on public lands.	WDFW is unaware of any data on the numbers of livestock raised on private lands versus public lands, thus the information requested in this comment was not included in the plan. For example, the U.S. Forest Service was unable to provide the numbers of livestock present on its grazing allotments in Washington. Additionally, many livestock are raised on a combination of private and public lands.
Although difficult, it is possible to protect livestock from coyotes. However, as wolves become present, it will be practically impossible to protect my livestock.	Presence of wolves will require livestock operators to undertake additional management measures, including modified husbandry techniques and use of non-lethal deterrence, to protect their stock. The recommended wolf plan also provides for the use of lethal control under various circumstances, either by state or federal agents, or the livestock owner (Chapter 4, Section E). The plan's compensation program would offset some of the costs associated with wolf depredations. Similarly, the plan would make funding available to assist livestock owners in implementing proactive non-

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	lethal deterrents to reduce losses from wolves. With these various tools and programs, WDFW believes that few livestock owners in Washington will be seriously affected by wolf recovery.
Livestock producers using public lands must change their way of doing business and become more wolf-friendly. They must adapt like all other businesses and industries. For example, livestock owners should not be allowed to leave their stock unattended on public grazing allotments.	The recommended wolf plan encourages, but does not require, the use of proactive non-lethal tools by livestock producers on both public and private lands to reduce wolf depredation. However, to receive compensation, producers will be responsible for following appropriate management methods that seek to limit wolf attractants in the vicinity of their livestock, including removal of dead and sick animals and other proactive measures. Livestock owners who have already been compensated for a depredation will be required to demonstrate that they are implementing appropriate management methods to be eligible for compensation for subsequent wolf depredation.
Support the wolf management measures appearing in Table 7 of the draft plan.	Comment noted. This table number referred to in the comment corresponds to Table 9 in the recommended wolf plan.
Oppose a "one size fits all" approach when making decisions about problem wolves.	As stated in Chapter 4, Section E, of the recommended plan, wolf managers will examine wolf-livestock conflicts on a case-specific basis when attempting to resolve conflict situations. A "one size fits all" approach to management would not be used.
Support giving livestock operators a wide range of management tools for resolving wolf-livestock conflicts. This should include liberal use of lethal control methods by landowners.	WDFW believes that the recommended wolf plan does give livestock producers a wide range of management tools for dealing with wolf-livestock conflicts, but does not believe that liberal use of lethal control is necessary. Excessive lethal control would likely prevent the establishment of a viable and self-sustaining wolf population in the state.
There appears to be a conflict in the plan between the need to build public tolerance of wolves and allowing liberal lethal management of wolves.	WDFW does not believe that the recommended wolf plan advocates a policy of liberal lethal management of wolves. Some use of lethal control is allowed by government staff, enforcement agents, and livestock owners under the plan, with restrictions on killing becoming more relaxed as wolves progress toward a delisted status. However, the plan attempts to limit the need for killing wolves through various actions, including establishment of a generous compensation program, emphasizing the use of proactive deterrents, restricting different types of lethal control during endangered, threatened, and sensitive statuses, and actively monitoring and, if needed, reducing the extent of lethal removals.
On public lands, grazing allotment holders should have less influence in determining management outcomes for wolves.	The recommended wolf plan does not take land ownership (public vs. private) into consideration during the implementation of non-lethal and most lethal management measures for wolves (see Table 9). However, some partner land agencies may wish to be more restrictive in the use of some measures on their administered lands to benefit wolves.
The US Forest Service should remove livestock from grazing allotments with wolves.	This is a decision for the US Forest Service to make, but WDFW does not advocate this position. WDFW and partner agencies will try to resolve conflicts between wolves and livestock on public grazing allotments using proactive management and, when necessary, lethal control.
The plan should consider advocating predator and mortality insurance as another means of protecting livestock owners from wolf depredations.	The recommended plan does not take a position on insurance for livestock. Few livestock operators carry this type of insurance on normal livestock.
The plan should designate specific areas of the state where livestock production takes precedence over wolf recovery. Wolves would be strongly	WDFW opposes this concept, which would be unfair to some livestock owners and also overlooks the fact that not all wolf packs will cause conflicts with livestock. Packs that stay out of trouble

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controlled, if needed, in these areas.	should be allowed to reside wherever they occur. Individual wolves dispersing through areas with livestock should also not be controlled unless they cause repeated conflict. Dispersal of this type is important for establishing wolves in new locations and maintaining genetic connectivity between existing wolf subpopulations.
All forms of wolf management in Idaho, Montana, and Wyoming have greatly failed in preventing wolf-livestock conflicts. I have no faith that WDFW can do any better. Wolves eventually do whatever they want.	With the lethal removal of more than 1,500 wolves involved in livestock depredations through 2010 and expanded use of proactive deterrent measures, wolf management practices in these states have certainly led to much lower levels of depredation than would have occurred without these forms of management.
Land management agencies require livestock on grazing allotments to be dispersed to reduce ecological damage, whereas WDFW recommends concentrating livestock to reduce wolf depredation. These guidelines are in conflict.	This comment is incorrect about land management agencies always requiring that livestock owners keep their stock dispersed on grazing allotments. In fact, land management agencies require allotment holders to follow different management procedures to make grazing compatible with different natural resources present on an allotment. This means that livestock should be dispersed in some situations, but concentrated in others. Therefore, on allotments with wolves, land management agencies would very likely talk to allotment holders about appropriate methods for avoiding wolf-livestock conflicts and require the holders to follow these.
Support lethal control of wolves for resolving livestock depredation.	Comment noted.
Support the provisions for lethal control by livestock owners proposed in the draft plan.	Comment noted.
Support using the same measures to lethally remove problem wolves on both public and private lands.	As described in Chapter 4, Section E, of the recommended wolf plan, lethal control to remove problem wolves involved in repeated wolf-livestock conflicts is allowed on both private and public lands by state and federal agents during all listed statuses. In situations where WDFW issues livestock owners a permit to lethally control wolves, this would mostly be allowed only on private land (the only exception is for resolving repeated depredations during sensitive status, which would be allowed on both private and public lands). WDFW believes restricting lethal take by livestock owners to primarily private land will assist with recovery of wolves on public lands during the state listed period.
Support lethal control only on private lands once wolves reach sensitive status.	WDFW will use non-lethal control methods whenever possible during endangered and threatened status, but believes that lethal control is necessary on both public and private lands under some circumstances to address wolf-livestock conflicts by removing problem animals that jeopardize public tolerance for overall wolf recovery.
Support "caught in the act" provision by livestock owners regardless of wolf listing status.	WDFW believes that use of the "caught in the act" provision should be restricted to users with a permit while wolves are state listed to avoid causing excessive mortality to wolves during the crucial early stages of reestablishment, which could possibly prevent recovery of the population. The recommended plan now allows this tool (with a permit) during all listed statuses.
Lethal control of wolves by livestock owners, including the "caught in the act" provision, should not be allowed during the endangered and threatened phases. Given the history of poaching in the state and the potential for misuse, this	Under the recommended wolf plan, state and federal wildlife agents would perform most lethal control of wolves during state endangered and threatened statuses. However, under limited circumstances, WDFW could consider issuing permits to livestock owners to lethally remove wolves during all state listed statuses.

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provision could seriously hamper recovery efforts during the critical early phases of recovery. For example, 2 wolves are already known to have been killed illegally in the state in 2008. Any removal of wolves during these legal phases should be done by professional staff from WDFW.	This could be done under the provisions for repeated wolf-conflict depredation and “in the act” of attacking livestock. Allowing permitted lethal control by livestock owners gives WDFW some additional flexibility in dealing with problem situations, but is not expected to be widely implemented. Allowing permitted livestock owners to immediately address their own wolf-livestock problems can prevent a further loss of tolerance for wolves by giving the owner an active role in protecting his/her stock. Additionally, it can reduce agency workload and costs and is more likely to result in the removal of only the offending animals.
The "caught in the act" provision should not be allowed on public land, where abuse could lead to higher illegal kill on these lands.	The "caught in the act" provision has been changed in the recommended wolf plan. It is now allowed only by livestock owners with a permit from WDFW on private land owned or leased by the livestock owner. Permits for this activity can be issued during any state listed status, but would be issued only after WDFW has confirmed that wolves previously wounded or killed livestock in the area and efforts to resolve the problem were deemed ineffective. Efforts to resolve the problem may either be preventative measures (i.e., documented non-lethal actions implemented specifically to minimize or avoid wolf-livestock conflict before the initial depredation), or non-lethal control efforts (i.e., non-lethal actions implemented specifically to minimize or avoid wolf-livestock conflict after the initial depredation). The permit holder is required to continue implementing non-lethal actions to minimize or avoid wolf-livestock conflicts during the life of the permit, with issuance of future permits being contingent upon this effort. “In the area” means the area known to be used by the depredating wolves. In some cases, the area may be specifically delineated by data (i.e., radio telemetry). WDFW will provide training to permit holders to ensure the appropriate use and prevent abuse of this provision.
Support lethal control of wolves on private and public lands, regardless of listing status, when wolves are attacking, chasing, or harassing livestock and domestic/herding dogs.	WDFW believes that allowing livestock owners to kill wolves chasing or harassing livestock (including domestic/herding dogs) would result in excessive mortality to wolves that would prevent or delay recovery.
Support lethal control of wolves by government agencies only.	Under the lethal control provisions of the recommended wolf plan, WDFW believes that most lethal control of wolves will be conducted by government staff or enforcement agents while wolves are state listed. However, under limited circumstances, WDFW could consider issuing permits to livestock owners to lethally remove wolves. This could be done under the provisions for repeated wolf-conflict depredation and “in the act” of attacking livestock. Allowing permitted lethal control by livestock owners gives WDFW some additional flexibility in dealing with problem situations, but is not expected to be widely implemented. Allowing permitted livestock owners to immediately address their own wolf-livestock problems can prevent a further loss of tolerance for wolves by giving the owner an active role in protecting his/her stock. Additionally, it can reduce agency workload and costs and is more likely to result in the removal of only the offending animals.
Support lethal control of wolves primarily by government agencies. As a second option, I support allowing animal control businesses or hunters with Master Hunter training to be issued	Options for allowing animal control businesses or hunters with Master Hunter training to conduct control efforts were not considered during preparation of the plan. WDFW believes this would be controversial, could be more costly to the government or

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species permits for conducting lethal control. Issuing special permits to private landowners and holders of grazing allotments should be a last resort.	livestock owners, and could result in liability issues, longer response times, and difficulty in verification of lethal control criteria. Furthermore, many livestock owners may prefer to conduct lethal wolf control themselves on their own land.
Public hunting of wolves needs to be included among the methods of problem animal control.	Public hunting of wolves will not be considered until after wolves are state delisted. As described in Chapter 3, Section C, of the recommended wolf plan, the issue of public hunting of wolves in Washington will be determined through a separate public review process after delisting takes place. Hunting of wolves could produce several benefits, including removal of problem animals, but is inappropriate while the species is still recovering.
Wolves should be treated similarly to coyotes with hunting allowed year round and no bag limit. Year-round hunting will also keep packs smaller.	This type of management would result in excessive mortality to wolves and would prevent recovery of the species in Washington. As described in the recommended wolf plan, WDFW's intention is to develop a viable and self-sustaining wolf population in the state, thereby allowing the species to be delisted.
Support liberal hunting opportunities for wolves as soon as their numbers begin to increase.	This type of management would result in excessive mortality to wolves and would prevent recovery of the species in Washington. As described in the recommended wolf plan, WDFW's intention is to develop a viable and self-sustaining wolf population in the state, thereby allowing the species to be delisted.
Oppose lethal take by livestock owners while wolves are state listed.	Based on experience from Idaho, Montana, and Wyoming, most wolf control in Washington would continue to be conducted by government staff or enforcement agents during the later stages of recovery (i.e., sensitive status). However, the wolf plan was changed to allow, under limited circumstances, WDFW to consider issuing permits to livestock owners to lethally remove wolves during all state listed statuses. This could be done under the provisions for repeated wolf-conflict depredation and "in the act" of attacking livestock. Allowing permitted lethal control by livestock owners gives WDFW some additional flexibility in dealing with problem situations, but is not expected to be widely implemented. Allowing permitted livestock owners to immediately address their own wolf-livestock problems can prevent a further loss of tolerance for wolves by giving the owner an active role in protecting his/her stock. Additionally, it can reduce agency workload and costs and is more likely to result in the removal of only the offending animals.
Oppose lethal control of wolves on public lands to manage depredation of livestock.	WDFW will use non-lethal control methods whenever possible, but believes that lethal control is necessary on both public and private lands under some circumstances to address wolf-livestock conflicts by removing problem animals that jeopardize public tolerance for overall wolf recovery. However, some partner land agencies may wish to be more restrictive in the use of some lethal measures on their administered lands to aid in wolf recovery.
Lethal control of individual problem wolves should only be used as a last resort.	WDFW will use non-lethal control methods whenever possible, but believes that lethal control is necessary on both public and private lands under some circumstances to address wolf-livestock conflicts to remove problem animals that jeopardize public tolerance for overall wolf recovery.
Oppose the "caught in the act" provision and believe it should be removed from the plan.	The "caught in the act" provision has been changed in the recommended wolf plan. It is now allowed only by livestock owners with a permit from WDFW on private land owned or leased by the livestock owner. Permits for this activity can be

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	issued during any state listed status, but would be issued only after WDFW has confirmed that wolves previously wounded or killed livestock in the area and efforts to resolve the problem were deemed ineffective. Efforts to resolve the problem may either be preventative measures (i.e., documented non-lethal actions implemented specifically to minimize or avoid wolf-livestock conflict before the initial depredation), or non-lethal control efforts (i.e., non-lethal actions implemented specifically to minimize or avoid wolf-livestock conflict after the initial depredation). The permit holder is required to continue implementing non-lethal actions to minimize or avoid wolf-livestock conflicts during the life of the permit, with issuance of future permits being contingent upon this effort. "In the area" means the area known to be used by the depredating wolves. In some cases, the area may be specifically delineated by data (i.e., radio telemetry). WDFW will provide training to permit holders to ensure the appropriate use and prevent abuse of this provision.
Oppose any lethal take of wolves while they are state listed.	WDFW will use non-lethal control methods whenever possible, but believes that lethal control is necessary on both public and private lands under some circumstances to address wolf-livestock conflicts by removing problem animals that jeopardize public tolerance for overall wolf recovery.
Oppose lethal control of wolves for any reason other than protection of human safety.	WDFW will use non-lethal control methods whenever possible, but believes that lethal control is necessary on both public and private lands under some circumstances to address wolf-livestock conflicts by removing problem animals that jeopardize public tolerance for overall wolf recovery.
Oppose any form of lethal control of wolves.	WDFW will use non-lethal control methods whenever possible, but believes that lethal control is necessary on both public and private lands under some circumstances to address wolf-livestock conflicts by removing problem animals that jeopardize public tolerance for overall wolf recovery.
The plan states that lethal wolf management "builds public tolerance for wolves" without offering any supportable basis for this conclusion. Compensation may indeed result in greater public tolerance of wolves, but killing wolves may simply foster an inaccurate view of wolves as nuisances. WDFW does not explain why non-lethal harassment or limiting lethal control to state agents is somehow insufficient to build tolerance.	WDFW will use non-lethal control methods whenever possible to resolve wolf-livestock conflicts. However, experience shows that non-lethal measures are usually not permanent solutions by themselves. Therefore, WDFW believes that lethal control is necessary on both public and private lands under some circumstances to address wolf-livestock conflicts by removing problem animals that jeopardize public tolerance for overall wolf recovery. Allowing permitted lethal control by livestock owners gives WDFW some additional flexibility in dealing with problem situations, but is not expected to be widely implemented. Allowing permitted livestock owners to immediately address their own wolf-livestock problems can prevent a further loss of tolerance for wolves by giving the owner an active role in protecting his/her stock. Additionally, it can reduce agency workload and costs and is more likely to result in the removal of only the offending animals.
Because wolves in the eastern third of Washington are likely to be relisted through federal court action, WDFW should prohibit all killing and harassment of depredating wolves in this part of the state.	This comment no longer applies because wolves were federally delisted in the eastern one-third of Washington through congressional action in May 2011.
Lethal control of wolves under this plan violates the federal Endangered Species Act.	The recommended plan has been revised to state more clearly that the U.S. Fish and Wildlife Service has lead authority over decisions

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	involving the lethal removal of wolves in the western two-thirds of Washington, where wolves remain federally listed as endangered. In these areas, the U.S. Fish and Wildlife Service would likely consult with and collaborate with WDFW on management decisions and actions pertaining to wolf conflicts. In the eastern one-third of Washington, where wolves are federally delisted, WDFW has lead management authority over wolves and would make decisions to use lethal control. WDFW would consult with other appropriate land management agencies before conducting lethal control on their lands.
No lethal control should be allowed until the wolf conservation and management plan has been approved.	WDFW believes that lethal control is necessary under some circumstances to address wolf-livestock conflicts by removing problem animals that jeopardize public tolerance for overall wolf recovery. However, WDFW would first use non-lethal control methods to address a problem situation. The Washington Fish and Wildlife Commission is expected to make a final decision on the recommended wolf plan by December 2011. With the small number of wolves currently present in Washington, it is unlikely that any serious conflicts involving wolves will occur before this date.
The "caught in the act" provision is ambiguous.	The "caught in the act" provision has been changed in the recommended wolf plan. It is now allowed only by livestock owners with a permit from WDFW on private land owned or leased by the livestock owner. Permits for this activity can be issued during any state listed status, but would be issued only after WDFW has confirmed that wolves previously wounded or killed livestock in the area and efforts to resolve the problem were deemed ineffective. Efforts to resolve the problem may either be preventative measures (i.e., documented non-lethal actions implemented specifically to minimize or avoid wolf-livestock conflict before the initial depredation), or non-lethal control efforts (i.e., non-lethal actions implemented specifically to minimize or avoid wolf-livestock conflict after the initial depredation). The permit holder is required to continue implementing non-lethal actions to minimize or avoid wolf-livestock conflicts during the life of the permit, with issuance of future permits being contingent upon this effort. "In the area" means the area known to be used by the depredating wolves. In some cases, the area may be specifically delineated by data (i.e., radio telemetry). WDFW will provide training to permit holders to ensure the appropriate use of this provision.
WDFW needs to develop clear criteria on when lethal control will be allowed for livestock-wolf conflicts. For example, the plan needs to provide additional detail on how incremental control measures will be implemented.	The recommended plan states that lethal control may be used in situations where livestock have clearly been killed by wolves, non-lethal methods have been tried but failed to resolve the conflict, depredations are likely to continue, and there is no evidence of intentional feeding or unnatural attraction of wolves by the livestock owner. Situations will have to be evaluated on a case-specific basis, with management decisions based on pack history and size, pattern of depredations, number of livestock killed, age and class of the livestock, availability of natural prey in the area, state listed status of wolves, extent of proactive management measures being used on the property, and other considerations. The plan does not provide detail on how incremental control measures would be implemented because of the many factors

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	(listed above) that must be considered in each incident.
The plan should give more detail on who will make decisions about lethal control and when and how those decisions will occur.	<p>The recommended plan has been revised to state more clearly that the U.S. Fish and Wildlife Service has lead authority over decisions involving the lethal removal of wolves in the western two-thirds of Washington, where wolves remain federally listed as endangered. In these areas, the U.S. Fish and Wildlife Service would likely consult with and collaborate with WDFW on management decisions and actions pertaining to wolf conflicts.</p> <p>In the eastern one-third of Washington, where wolves are federally delisted, WDFW has lead management authority over wolves and would make decisions to use lethal control. WDFW would consult with other appropriate land management agencies before conducting lethal control on their lands. Under these circumstances, state and district wolf managers for WDFW and, where applicable, wildlife managers from the appropriate partner agency would be involved in decisions about lethal control. The process for deciding when and how lethal control will be implemented is described in Chapter 4, Section E, of the recommended plan.</p>
If WDFW chooses to allow lethal management, it should set specific limitations on the total numbers of wolves that may be killed annually due to wolf conflicts. Further, if lethal management is allowed, WDFW should prohibit the killing of any member of a breeding pair.	Wolf-livestock conflicts cannot be ignored by wolf managers, especially if they jeopardize overall wolf recovery. WDFW will use non-lethal control methods to resolve conflicts whenever possible, but believes that lethal control is necessary on both public and private lands under some circumstances to address wolf-livestock conflicts by removing problem animals that jeopardize public tolerance for overall wolf recovery. Lethal removal of members of the breeding pair will be avoided if possible, but if they are confirmed to be involved in depredations, their removal may be necessary.
The plan should give more detail on how WDFW will investigate cases where lethal force was used.	Enforcement agents or other staff from WDFW, the U.S. Fish and Wildlife Service, or USDA Wildlife Services would follow up on all incidents of wolves being killed by livestock owners with WDFW-issued permits to ensure compliance with permit requirements. Where wolves were killed in non-permitted situations, these same personnel would investigate the cases to determine their circumstances and compliance with the law.
WDFW should not use USDA Wildlife Services for lethal control because they do a poor job of removing the individual wolves responsible for depredations, and frequently remove non-offending wolves. The track record of Wildlife Service's dealings with wolf control in other states supports this concern. Wildlife Services also seems to enjoy killing wolves.	Comment noted.
If wolf numbers must be reduced, WDFW should identify problem packs and eliminate these.	This management scenario would not exist while wolves were state listed (when WDFW is trying to increase numbers) and is therefore outside the scope of the recommended wolf plan. WDFW intends to address conflicts in a timely manner using either non-lethal or lethal methods so that problem wolves and packs do not build up and jeopardize public support for overall wolf recovery.
Oppose any consideration of a "3 strikes rule" for dealing with problem wolves, as in New Mexico and Arizona.	A "3 strikes rule" is not being considered for wolf management in Washington.

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Wolf control can disrupt natural wolf pack dynamics that affect traditional breeding patterns and have negative consequences on pack behavior and genetics.	These problems are noted in the recommended plan, based on the study of Brainerd et al. (2008).
The plan should emphasize non-lethal deterrents for management, such as carcass burial, use of guard animals and predator fencing. During the early stages of wolf recovery, non-lethal methods should be emphasized instead of lethal take.	The recommended wolf plan encourages the use of non-lethal deterrents to reduce wolf-livestock conflicts, especially during endangered and threatened statuses. As stated in Chapter 12, Task 4.1.1, WDFW will emphasize non-lethal techniques early in recovery and will transition to greater use of lethal control if necessary as wolves approach delisting status. Under Task 4.3.4, WDFW and partners will seek funding to assist livestock producers with implementing non-lethal deterrents.
Non-lethal methods are not effective in preventing wolf depredation of livestock, plus these methods are impractical and costly, especially to large-scale cattle operations.	Proactive measures do have limitations, but when used in combination, they often temporarily succeed in reducing the vulnerability of livestock to wolf depredation (see Chapter 4, Section B). However, they are usually not permanent solutions in themselves and can be costly to implement. To help offset some costs, WDFW and partners will seek funding to assist livestock producers with implementing non-lethal deterrents (see Chapter 12, Task 4.3.4).
Some suggested non-lethal measures are impractical. For example, the suggestion for delaying spring calf turn-out until the calves are at least 200 pounds is a foolish requirement. A wolf will kill a calf weighing 500 lbs just as fast and easy as it will kill a 150-lb calf. Use of portable fencing and fladry as night pens under open grazing conditions is not feasible for cattle operations. In regards to radio-activated light and noise scare systems to frighten wolves away from confined livestock, will every wolf have a radio collar?	Delaying spring turnout may be practical for some producers, but not for others. As stated in Chapter 4, Sections A and B, smaller calves have been shown to be the most vulnerable to wolves in neighboring states. This comment is correct that fladry and portable fencing are generally not suitable for large cattle operations. Radio-activated light and noise scare systems work well when several members of a pack wear radio collars, especially when these are individuals that actively participate in hunting for the pack.
Some suggested non-lethal measures are costly, for example, portable fencing, range riders, and radio collars to signal radio-activated guard boxes. WDFW should pay for the cost of proactive techniques to help ranchers adopt these measures.	Many proactive non-lethal deterrents will impose additional costs on the livestock producers using them (see Chapter 14, Section B). Under Chapter 12, Task 4.3.4, of the recommended plan, WDFW and partners will seek funding to assist producers in implementing these types of deterrents.
Non-lethal harassment of wolves during the act of attacking livestock should be allowed by anyone at any time.	Under Chapter 4, Section E, of the recommended plan, non-injurious harassment of wolves is allowed by livestock owners whenever wolves are near livestock on private and public lands during all listed phases. The recommended plan also allows livestock owners and grazing allotment holders (or their designated agents) to use non-lethal injurious harassment on their own land or their legally designated allotment, respectively, during all listed phases, but requires they have a permit and have received training from WDFW for this type of harassment.
Support the wolf plan's proposal to allow non-lethal injurious harassment with a permit and training from WDFW during all listing statuses.	Comment noted.
Non-lethal harassment using rubber bullets and other methods is unlikely to be effective.	Use of rubber bullets and other non-lethal munitions to harass wolves has not been well evaluated to determine effectiveness. Relatively few producers use rubber bullets and there have been relatively few cases of wolves being hit by rubber bullets. Bangs et al. (2006) reported that some wolves that previously stood and watched people would immediately run from people after having

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	been shot at by non-lethal munitions.
Oppose use of non-lethal injurious harassment on public land.	Non-lethal injurious harassment is intended to make wolves afraid of humans and livestock, thus it has potential benefits to wolf conservation and management by reducing depredation on both private and public lands. To date, there have been relatively few cases of wolves being hit by rubber bullets or other non-lethal munitions in neighboring states and very few if any cases of animals being seriously injured by them.
Oppose the requirement that livestock operators must receive training before they can harass wolves.	Under the recommended wolf plan, training is only required for the use of non-lethal projectiles (i.e., rubber bullets and beanbags). Training is important because these munitions can cause serious injury or kill wolves if used improperly.
Aspects of the plan's proposals for non-lethal harassment violate the federal Endangered Species Act.	<p>The recommended plan has been revised to state more clearly that the U.S. Fish and Wildlife Service has lead authority over decisions involving the non-lethal harassment of wolves in the western two-thirds of Washington, where wolves remain federally listed as endangered. In these areas, the U.S. Fish and Wildlife Service would likely consult with and collaborate with WDFW on management decisions and actions pertaining to wolf conflicts. However, under a federal ESA Section 6 Cooperative Agreement with the USFWS, WDFW is allowed to use non-lethal control measures on any federally listed species in the state.</p> <p>In the eastern one-third of Washington, where wolves are federally delisted, WDFW has lead management authority over wolves and would make decisions to use non-lethal control. WDFW would consult with other appropriate land management agencies before authorizing non-lethal control on their lands.</p>
Oppose moving wolves that have been involved in depredation as a non-lethal solution. This will only transfer the problem to another location. They should be euthanized.	Studies from the northern Rocky Mountain states concluded that moving wolves involved in depredation was most effective during the early stages of wolf recovery, and that use of other non-lethal techniques is probably better for preventing or resolving conflicts when larger wolf populations exist (see Chapter 4, Sections B and E). These studies showed that 18% of relocated wolves resumed depredation of livestock near their release site. Because of its potential drawbacks, moving wolves involved in depredation will be considered on a case-specific basis under the recommended plan, and would most likely be done only during the endangered and threatened phases.
Oppose the wolf plan's recommendation for strengthening the genetic diversity of the state's wolf population by releasing surplus or offending wolves from unrelated packs in different parts of the state over time.	The recommended wolf plan does <u>not</u> currently recommend that problem wolves be moved for this purpose. Moving single wolves to strengthen the genetic diversity of the state's wolf population is a potentially valuable conservation tool (see Chapter 12, Task 1.5), but may not be necessary. Although the details of using this technique in Washington have not yet been established, it likely wouldn't be used until the later stages of recovery or following delisting after genetic testing is conducted and confirms problems with lack of genetic diversity. Surplus wolves could be used for this purpose, but it is unlikely that problem animals would be considered.
Support moving problem wolves to more remote areas of the state as an alternative to lethal control.	Studies from the northern Rocky Mountain states concluded that moving wolves involved in depredation was most effective during the early stages of wolf recovery, and that use of other non-lethal techniques is probably better for preventing or resolving conflicts

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	when larger wolf populations exist (see Chapter 4, Section E). These studies showed that 18% of relocated wolves resumed depredation of livestock near their release site. Because of its potential drawbacks, moving wolves involved in depredation will be considered on a case-specific basis under the recommended wolf plan, and would most likely be done only during the endangered and threatened phases.
Support moving problem wolves to the Olympic Peninsula where the likelihood of repeat offenses is likely low due to the presence of reduced livestock numbers.	As stated in the recommended plan (Chapter 4, Section E), problem wolves generally would be moved only within the same recovery region. The intention of moving problem wolves is to resolve wolf-livestock conflicts and to avoid killing wolves, not to reestablish new populations in unoccupied recovery regions, which requires substantial advance planning and public review.
Maybe sterilization should be considered as another non-lethal tool to control wolf population size as well as livestock depredation.	This tool could perhaps be used under certain circumstances in the future if it is ever shown to be effective with wolves, but WDFW would not consider using it in Washington before the species is delisted. WDFW is aware of sterilization being used in only two studies, neither of which has been published. The technique apparently worked fairly well but was costly in Alaska, whereas in the Yukon, it generally proved unsuccessful. Sterilization is likely to be controversial with the public.
Commend WDFW for proposing separate livestock depredation compensation programs for documented and unknown losses.	Comment noted.
There is a distressing lack of detail in the wolf plan on how the verification process for livestock depredation will occur.	Details on the verification process appear in Chapter 4, Section G, and Chapter 12, Task 4.2, of the recommended wolf plan.
The process for compensating ranchers for their livestock losses due to wolf kills should be as easy as possible with minimal "red tape". For example, the measures for verification of losses are too cumbersome and bureaucratic.	Details of the compensation program have not yet been established, but two important elements are to make the program simple to implement and that it must offer timely processing and payment of claims. Regarding verification of livestock losses to wolves, the process used in the recommended wolf plan is necessary so that the cause of a death/injury can be correctly attributed to the right predator or other cause. This will reduce the likelihood of erroneous or fraudulent claims which, if substantial, would jeopardize the entire compensation program.
WDFW must respond to a reported wolf-livestock interaction within 3-6 hours day or night. Time is of the essence.	A rapid response is critical to determining the cause of livestock mortalities, whether it be from wolves, other predators, or other causes. The plan (Chapter 12, Task 4.2.3) indicates that on-site inspections will be made within 24 hours after the incident is reported. This response time should be sufficient for making correct determinations.
WDFW should respond to wolf conflicts on private lands within a reasonable amount of time, otherwise private landowners should have the right to protect their livestock on their own.	A rapid response is critical to determining the cause of livestock mortalities, whether it be from wolves, other predators, or other causes. The plan (Chapter 12, Task 4.2.3) indicates that on-site inspections will be made within 24 hours after the incident is reported. This response time should be sufficient for making correct determinations.
Concerned that livestock owners cannot always prove that a wolf killed their livestock and that they will therefore not be adequately compensated. For example, depredated livestock carcasses may be found too late to verify that the animals were indeed killed by wolves.	This is a legitimate concern for producers grazing livestock on large land parcels or in remote locations, and is one of the limitations of most compensation programs. Based on a recommendation by the Wolf Working Group, the recommended plan would compensate livestock operators at a 2:1 ratio for carcasses found on grazing sites of 100 or more acres (and where

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	the agency determines it would be difficult to survey the entire acreage or that not all animals are accounted for) as a method to reimburse them for suspected wolf kills that go undetected. The recommended plan also compensates ranchers, albeit at a reduced rate, for "probable" depredations wherein wolves likely caused the depredation but clear confirmation was not obtained.
Measureable criteria for establishing the value of livestock, including consideration of reproductive status, age, readiness for market, etc. should be incorporated into the plan for determining compensation.	Under the recommended plan, compensation will be based on the current market value of an animal, which is defined as its value at the time it would have normally gone to market. Current market value should reflect many factors such as age, reproductive status, and readiness for market.
The plan needs to define "full value" compensation and whether this includes value for breeding, pregnancies, animal losses covered by insurance, registered animals costing thousands of dollars, sentimental value, etc.	Current market value was already defined in Chapter 4, Section G, of the recommended plan and reflects factors such as age, reproductive status, and readiness for market. A definition was added to the glossary of the plan. Under the compensation program in the recommended plan, current market value does not take into consideration the value of an animal for breeding, future pregnancies, animal losses covered by insurance, or sentimental value of the animal to the owner. However, the program would pay full compensation for registered animals with high values providing the owner has verification proving the value of the animal.
The proposed compensation package should cover wolf-related losses from stress and weight loss on livestock and lost time for ranchers. Compensation should also cover the non-tangible value of losses. For example, ranchers put considerable personal effort, time, and emotion into raising their livestock and improving their herds.	Various physiological impacts in livestock related to the presence of wolves, such as weight loss, reduced birth rates, and greater miscarriages, may occur, but have not been verified under field conditions. Two recent studies (Laporte et al. 2010, Muhly et al. 2010b) have shown that cattle increase their movements and avoid grazing sites of high quality in response to wolf presence, but did not confirm that this resulted in the problems listed above. These same problems can also result from other causes, such as poor forage and weather conditions making it difficult to measure the true impacts of wolves on livestock. Because of these uncertainties, the compensation package in the recommended wolf plan does not cover these concerns. Non-tangible losses certainly occur, but are also not included in the compensation package because it is impossible to assign a monetary value to them.
Providing compensation for probable losses of livestock invites the possibility of fraud. What standards exist for determining "probable" depredation by wolves.	Determinations of probable wolf depredations will be made by trained personnel from WDFW or USDA Wildlife Services, and therefore would not be susceptible to fraudulent claims. Criteria for classifying probable wolf depredations appear in Chapter 4, Section G, of the recommended plan.
Concerned about the potential for abuse of the compensation program. To prevent abuses, a fine of \$10,000, jail time, and rewards for those turning in the abusers should be enacted.	Abuse of compensation programs is an important concern and can jeopardize the programs for all livestock owners. Penalties for fraudulent claims could be incorporated into the compensation program, which will be developed under Chapter 12, Task 4.3, of the recommended wolf plan.
Lack confidence in WDFW's ability to administer the compensation program because of its poor track record in handling issues regarding elk and other wildlife damage to agriculture.	Comment noted. WDFW (with help from the Legislature) has been working hard to improve its handling of and its responses to wildlife damage issues. This has included revisions to statutes and regulations pertaining to wildlife damage, and improved processing for submitted claims.
The plan needs to clarify whether compensation will be paid for guarding/herding dogs injured or killed by wolves.	As stated in Chapter 4, Section G, of the recommended wolf plan, compensation will be paid for guarding/herding animals killed by wolves.

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The plan should provide livestock owners with a fair and effective compensation package for losses of livestock as an alternative to allowing liberal use of lethal control of wolves.	Compensation and judicious use of lethal control are both considered necessary in addressing wolf-livestock conflicts, preventing further loss of public tolerance for wolves, and ultimately in achieving wolf recovery. Non-lethal measures for resolving wolf-livestock conflicts will be considered first, but in serious conflict situations where non-lethal measures have failed to stop depredations, lethal control will be performed if necessary to resolve the conflicts.
Compensation should be set at a "10 to 1" ratio.	The plan's compensation package, which was developed by the Wolf Working Group, is one of the most generous programs in the nation. Payment ratios higher than 2:1 are not justifiable unless new research confirms that higher ratios are appropriate. Furthermore, payment ratios exceeding 2:1 will likely exhaust revenues more quickly, result in stronger public opposition to the program, and could result in larger numbers of fraudulent claims.
The compensation package proposed in the plan is not "generous," as claimed in the draft environmental impact analysis. Livestock owners should receive greater compensation for losses than what is currently proposed in the plan.	The compensation package, which was developed by the Wolf Working Group, is one of the most generous in the nation. Most other compensation programs in the country pay 1:1 ratios (see Chapter 4, Section C). Payment ratios higher than 2:1 are not justifiable unless new research confirms that higher ratios are indeed appropriate. Furthermore, payment ratios exceeding 2:1 will likely exhaust revenues more quickly, result in stronger public opposition to the program, and could result in larger numbers of fraudulent claims.
Support the "2 to 1" compensation package proposed in the plan.	Comment noted.
Support the "2 to 1" compensation, but this option should be provided for all losses of livestock and herding dogs, regardless of property size. Owners of livestock that are constantly harassed should also receive compensation.	Compensation at the higher "2 to 1" rate is not necessary on grazing parcels of less than 100 acres, where producers should be able to find all livestock carcasses. WDFW adopted the Wolf Working Group's recommendation that livestock operators be paid the higher rate for carcasses found on larger acreages as a method to reimburse operators for suspected wolf kills that go undetected. Harassment of livestock by wolves can potentially result in weight loss, reduced birth rates, and greater miscarriages, but these have not been verified under field conditions. Two recent studies (Laporte et al. 2010, Muhly et al. 2010b) have shown that cattle increase their movements and avoid grazing sites of high quality in response to wolf presence, but did not confirm that this resulted in the problems listed above. These problems can also result from other causes, such as poor forage and weather conditions, making it difficult to measure the true impacts of wolves on livestock. Because of these uncertainties, the compensation package does not address harassment.
The "2 to 1" concept should be used to compensate livestock owners on small plots (i.e., less than 100 acres), who likely will suffer a greater financial impact from a depredation than wealthier livestock owners with access to larger grazing areas.	Livestock owners on parcels of less than 100 acres would still receive full compensation per animal lost to wolves under the recommended wolf plan. The "2 to 1" compensation rate is not necessary on these smaller parcels because producers should be able to find all livestock carcasses. WDFW adopted the Wolf Working Group's recommendation that livestock operators be paid at the higher rate for carcasses found on larger acreages as a method to reimburse operators for suspected wolf kills that go undetected.
Support the proposed "2 to 1" compensation package on private lands, but believe that	WDFW adopted the Wolf Working Group's recommendation for a compensation package, which treats producers using grazing

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compensation on public lands should only be paid at fair market value.	parcels of 100 or more acres (and where the agency determines it would be difficult to survey the entire acreage or that not all animals are accounted for) equally on both private and public lands. This is intended to provide fair compensation to producers on both types of land ownership and will hopefully prevent further loss of tolerance for wolves among those using public lands.
The 100-acre requirement for "2 to 1" compensation is too small. Livestock owners should be able to detect all carcasses on lands somewhat larger than this.	WDFW adopted the Wolf Working Group's recommendation that livestock operators be paid at a 2:1 ratio for carcasses found on grazing parcels of 100 or more acres (and where the agency determines it would be difficult to survey the entire acreage or that not all animals are accounted for) as a method to reimburse operators for suspected wolf kills that go undetected. The Working Group discussed the parcel size limit at which the higher compensation rate should be paid and decided that 100 or more acres was an appropriate size.
Compensation should be at least 1.5 times the value of any animal killed.	WDFW adopted the Wolf Working Group's recommendation that livestock operators be paid at a 2:1 ratio for carcasses found on grazing parcels of 100 or more acres (and where the agency determines it would be difficult to survey the entire acreage or that not all animals are accounted for) as a method to reimburse operators for suspected wolf kills that go undetected.
The compensation program should not pay more than the full market value for livestock depredations for the following reasons: 1) funding will undoubtedly be limited yet the proposed program will be the most generous of any existing in the U.S., 2) Washington does not have the vast rangelands, such as those found in Montana, 3) high compensation rates will reduce the incentive for livestock owners to adopt reasonable non-lethal deterrent methods, and 4) WDFW could find itself paying substantially more for compensation than if it had encouraged greater use of non-lethal methods.	Some of these points represent valid concerns about the compensation program laid out in the recommended wolf plan. Points 3 and 4 may be invalid because the recommended plan requires livestock producers to implement appropriate management methods (i.e., proactive deterrent measures) to be eligible for compensation payments.
For confirmed and probable depredations, support compensation for full value for each livestock animal killed on parcel sizes >5 acres.	The compensation ratios and parcel size requirements in the recommended wolf plan were developed based on consensus among members of the Wolf Working Group.
Livestock owners should not be compensated for wolf depredations that occur on public land.	WDFW adopted the Wolf Working Group's recommendation for a compensation package, which compensates producers for wolf-related losses on both private and public lands. In this regard, the program matched the former Defenders of Wildlife compensation program in other western states, which also reimbursed for wolf depredations on both private and public lands (see Chapter 4, Section C). This approach provides equal treatment for producers and will hopefully prevent further loss of tolerance for wolves among the livestock community.
Livestock owners should not be compensated for unknown losses.	WDFW adopted the Wolf Working Group's recommendation for a compensation package, which includes development of a separate program for reimbursement of unknown losses (see Chapter 4, Section G). Full program details must still be worked out (see Chapter 12, Task 4.3.3). WDFW acknowledges that compensation for unknown losses is controversial and complex to implement, but believes that the provision is potentially important to address the reality of wolf depredations that go unverified.

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Livestock owners should not be compensated for probable livestock losses associated with wolf depredation.	The compensation package in the recommended wolf plan follows the former Defenders of Wildlife compensation program used in other western states by reimbursing for probable wolf-related livestock losses. A number of factors are considered by investigators in determining whether wolves likely caused the depredation (see Chapter 4, Section G). These include (1) recent confirmed predation by wolves in the same area or nearby areas, and (2) evidence (e.g., telemetry monitoring data, sightings, howling, fresh tracks, etc.) suggesting that wolves may have been in the area when the depredation occurred.
Oppose all payment of compensation. Livestock operators should not be subsidized with taxpayer money.	Compensation programs are intended to prevent further loss of tolerance for wolves among the livestock industry and other segments of the general public. To date, most compensation for wolf depredation in the West has been paid by a private organization (Defenders of Wildlife). However, this program has ended. Continued payment of compensation in Washington in the future may require funding from government sources, although private sources will also be sought (Chapter 4, Section G).
Livestock operators need to accept some financial loss from predators as a part of their operating expenses. Furthermore, ranching has long been subsidized by taxpayers.	Compensation programs are intended to prevent further loss of tolerance for wolves among the livestock industry and other segments of the general public, which could jeopardize overall wolf recovery. Compensation programs do not cover all of the expenses that some livestock operators will experience with the return of wolves. As described in Chapter 14, Section B, other expenses may be incurred, such as the need for additional labor and ranch supplies, and those associated with changes in grazing methods and possible physiological impacts to livestock.
Ranchers should be required to use proactive methods to minimize wolf-livestock conflicts before being eligible for compensation.	The recommended plan does require ranchers to implement appropriate management methods (i.e., proactive deterrent measures) to be eligible for compensation payments (see Chapter 4, Section G).
Livestock operators must be eligible for compensation regardless of what they have done to take proactive measures.	The recommended plan does require ranchers to implement appropriate management methods (i.e., proactive deterrent measures) to be eligible for compensation payments (see Chapter 4, Section G).
Not all depredations will be reported due to the cost of reporting and the lack of guaranteed compensation funding.	This comment is probably correct that some producers may choose not to report wolf depredations on their livestock. Under Chapter 12, Task 4.3.4, of the recommended plan, WDFW will work with livestock groups and others to secure a funding source for the compensation program described in the recommended plan. Secure funding would make this program available to all claimants seeking compensation.
I suggest naming the state's program for compensation of livestock losses and covering non-lethal measures as a "livestock loss prevention and compensation fund" to build greater support for its funding.	This suggested change was not made in the recommended plan, but could be made in the future as the compensation program is further developed.
As a professional agronomist who deals with livestock owners, I suggest using a stronger legal definition for confirmed compensation. A standard of "more likely than not" should be used rather than "to a reasonable degree of scientific certainty." This will reduce potential ambiguity in determinations.	The recommended plan's definitions for classifying depredation follow those used by USDA Wildlife Services.

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<b>Chapter 5 – Wolf-Ungulate Interactions</b>	
Managing for sustainable ungulate populations will benefit many more nongame species than will managing for wolf recovery. This is because ungulate hunting generates far greater funding for habitat conservation than wolves will.	Habitat conservation provides benefits to multiple wildlife species. Recovery of listed species requires more specific conservation planning, such as this state wolf plan.
The public would be better served by having WDFW do a better job of managing and enhancing the state's ungulate populations rather than having the agency try to convince the public that wolf recovery will help manage these herds.	WDFW has a dual mandate to preserve, protect, and perpetuate the native wildlife species of the state and to provide hunter opportunity by maintaining sustainable ungulate populations. As stated in the wolf plan, WDFW believes it can accomplish both objectives. The wolf plan does not state that wolf recovery will be used to "help manage" ungulate herds in Washington as indicated in this comment.
The plan should acknowledge that during the past 100 years sport hunters, in concert with fish and wildlife agencies and aided by funds generated by the Pittman-Robertson Act, have brought back ungulate populations, which will serve as the prey base for wolves.	WDFW readily acknowledges the important role that hunters have played in supporting the conservation of fish and wildlife resources for many decades. This fact is widely recognized among fish and wildlife managers and does not need to be restated in the wolf plan.
Wolf recovery efforts by WDFW jeopardize all of the past and current management efforts by the agency and hunters to strengthen elk and deer numbers in the state.	As noted in the background sections of the plan (Chapters 5, 14), observations from Idaho, Montana, and Wyoming, where most elk and deer populations remain at or above management objectives, suggest that as wolf populations increase in Washington, they will have some localized impacts on ungulate abundance and habitat use, but they will have a relatively small impact at a statewide level.
The plan states that ungulate herds will be managed to provide an adequate prey base for wolves. How will this be accomplished?	Continued implementation of WDFW game management plans for elk, deer, and other species should result in achieving healthy population objectives for these species. This goal would be accomplished primarily through habitat improvement, harvest management, and minimizing illegal hunting. Harvest objectives may need to be adjusted if overall predation levels increase. Harvest objectives should be compatible with long-term sustainable populations of predators and prey.
The proposed plan will make hunter concerns secondary to the needs of wolves.	The plan broadly calls for managing ungulate populations and their habitats to provide both an adequate prey base for wolves and to maintain harvest opportunities for hunters. It does this through continued implementation of WDFW game management plans for elk, deer, and other ungulates, which should result in achieving healthy population objectives for these species.
Sportsmen want to be able to harvest deer and elk, and do not want to compete with wolves for game.	As described in the background sections of the plan (Chapters 5, 14), observations from Idaho, Montana, and Wyoming, where most elk and deer populations remain at or above management objectives, suggest that as wolf populations increase in Washington, they will have some localized impacts on ungulate abundance and habitat use, but they will have a relatively small impact at a statewide level. Thus, WDFW does not expect wolves to interfere with the harvest of deer and elk in most areas of the state.
The plan needs to address tribal harvest levels of game because it affects prey levels for wolves.	The recommended plan doesn't specifically discuss levels of tribal harvest of game and how it might affect wolf recovery. Most tribal harvest data is shared with WDFW. This information is then incorporated into the agency's management of game populations. Tribal harvest statistics are available for all western Washington

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	tribes and most eastern Washington tribes at the Northwest Indian Fisheries Commission website.
In some areas of the state (i.e., Okanogan, Chelan, and Ferry counties), WDFW's regulations are designed to keep deer and elk numbers small to prevent agricultural damage. However, this policy will deprive reestablishing wolves of an important prey source. The plan does not discuss this conflict in management goals. Allowing greater elk abundance in these areas would potentially provide more prey for wolves, reduce wolf conflicts with livestock, and provide additional big game hunting opportunities, but could increase crop damage.	Although WDFW does manage for reduced deer and elk populations in some areas to reduce recurring property damage, deer and elk numbers are not so greatly diminished that it would greatly affect wolf reestablishment. For example, one of the counties (Okanogan) mentioned in this comment had the first wolf pack documented in the state in 2008. WDFW has long recognized that managing for large ungulate populations must be balanced against concerns over localized property damage.
How is WDFW going to sustain large wolf packs given that this Rocky Mountain wolf is larger than the native wolf of this area and will require much more food?	The belief that the wolves reintroduced in the mid-1990s to the northern Rocky Mountains states from west-central Alberta and east-central British Columbia were larger than the wolves originally present is erroneous. Wolves from the Canadian and northern U.S. Rockies, interior British Columbia, Northwest Territories, and nearly all of Alaska are closely related and belong to a single subspecies known as <i>Canis lupus occidentalis</i> . This conclusion is based on the examination of historical and recent wolf specimens collected throughout North America. Those originating from the region described above have proven to be genetically and morphologically similar. Examples of this are seen in the wolves harvested during the 2009 hunting seasons in Montana and Idaho. Adults from Montana weighed an average of 97 lbs with a maximum of 117 lbs, whereas adults from Idaho weighed an average of 101 lbs with a maximum of about 130 lbs. These weights are similar to the sizes of the wolves that occurred in these states in the 1800s and early 1900s. Thus, it is wrong to believe that the wolves now entering Washington are larger than the ones historically present and will require more prey to support themselves.
Wolves will move to low elevations during winter and prey on wintering ungulate populations. Deer and elk already struggle to survive on wintering sites because of steady human encroachment.	Wolves in some locations will move to lower elevations during winter and spring where there are more prey. This has already been seen with one of Washington's existing wolf packs. WDFW will use adaptive management to address serious problems involving wolves and wintering ungulate populations. Wolves have generally not proven to be a major problem in these situations in neighboring states.
The plan should stipulate maintaining a balance between predators and prey. This will ensure that healthy ungulate populations will persist, but would probably require that cougars be reduced.	The plan stipulates that management of ungulate and carnivore populations should be integrated on an ecological basis. The statewide Game Management Plan includes chapters for each of Washington's major ungulate and carnivore species, and management plans exist for eight of the state's 10 elk herds and white-tailed deer. Achieving management goals for all of these species will be enhanced if the plans are considered collectively. The ecological roles of predators and prey should be integrated in these management plans. Thus, WDFW will not take steps to control other predator species to make room for wolves.
The plan seems to assume that adequate prey exists in many parts of the state to support its population objectives. However, the plan lacks an	The plan already contains several analyses of potential suitable habitat for wolves in Washington that included prey density as part of the analysis (see Chapter 3 Section A). Results of the analyses

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analysis of potential carrying capacity for wolves based on prey abundance. This analysis should be included as part of the process for establishing delisting objectives and should be done before initiating wolf recovery.	show varying but adequate amounts of estimated suitable habitat for wolves in the state. WDFW conducted population modeling of the Washington's wolf population using one of the analyses of potential suitable habitat noted above. This test indicated that state's wolf population has sufficient habitat available to expand to as many as 58 packs within 50 years.
As a non-hunter, I am forced to accept not hiking in the autumn and must tolerate the introduction of non-native turkeys and their harmful effects on other wildlife, therefore it is reasonable for hunters to have to tolerate some wolves.	Comment noted.
Deer and elk populations do not exist solely as recreation for people to hunt.	In addition to providing a hunting resource, sustainable populations of deer and elk also 1) give recreational viewers of wildlife the opportunity for seeing game, 2) provide prey for a variety of carnivores, and 3) help fulfill other aspects of the ecological roles of these species in natural ecosystems.
Hunters may need to change their personal hunting style in order to adapt to changes in ungulate behavior due to the presence of wolves.	This comment is likely to be true in some locations. Recent research indicates that elk at Yellowstone National Park now spend more time in forested areas, on steeper slopes, and at higher elevations than before wolf reintroductions. Elk have also changed their herding behavior and movement rates in response to wolves. These types of behavioral changes in areas outside of parks suggest that hunters may need to adjust their own strategies for locating elk.
The plan needs to provide estimates of the numbers of elk and deer that wolves will kill per year in Washington. These figures need to be made public.	This information was already present in Chapter 14 of the draft plan, but has been moved to Chapter 5, Section E, where it is now more prominently featured.
WDFW should pay for damage to agricultural crops resulting from wolves pushing ungulates onto croplands.	Under WAC 232-36, WDFW can now compensate farmers for ungulate damage to crops, regardless of cause, if funding is available and other eligibility requirements are met.
Hunting groups have assisted WDFW in wildlife conservation activities for many years. If the current proposed plan is approved, some members of these groups will stop assisting the department in the future with conservation activities, such as raising money and assisting with habitat improvements for ungulate and other wildlife.	WDFW is required both to manage game populations at sustainable levels to provide hunter opportunity and to recover state listed species like the wolf. WDFW readily acknowledges the many contributions that hunting groups have made to wildlife conservation in Washington over the years. WDFW would hope that hunters would continue to volunteer their time and efforts to enhance the resource, but recognizes that some hunters may wish to end their contributions. As discussed in the recommended wolf plan, WDFW does not believe that wolves will have serious impacts on most ungulate populations in Washington, although they could contribute to localized declines in some populations.
The plan is very thorough and accurate in describing the complex relationships between wolves and wild ungulates and the potential impacts that may occur in Washington.	Comment noted.
Projected effects of wolves on ungulate populations are inaccurate, out of date, or a deliberate distortion of the truth.	In spring 2011, during preparation of the recommended plan, WDFW updated the information appearing in Chapter 5, Section B, regarding wolf impacts on ungulate populations in neighboring states. This work included contacting wolf and game managers in Idaho and Montana and review of recent publications from these states and Wyoming. Observations from these states continue to indicate that most elk and deer populations remain at or above management objectives. However, wolves have contributed to

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	some localized declines in ungulate abundance and changes in habitat use. These same types of effects are therefore expected in Washington.
WDFW is using outdated science or ignoring the science that indicates wolves will have major adverse impacts on ungulate populations. The plan should cite the publications of Creel et al. 2009 and V. Geist.	The wolf plan contains an up-to-date review of the science pertaining to wolf-ungulate interactions. The study of Creel et al. (2009) was already discussed in the draft plan (see Chapter 5, Section A). It should be noted that a more recent study (White et al. 2011) refutes some of the findings of Creel et al. (2009). Valerius Geist has not published any scientific studies of wolf-prey dynamics and is therefore not cited in the wolf plan.
The plan states that wolf predation has less of an impact on ungulate populations than the antlerless harvest. Please explain.	The plan cites the findings of Eberhardt et al. (2007), who reported that predation by wolves has a much lower overall impact on ungulate populations than does antlerless harvest by hunters. Wolves primarily prey on young of the year and older individuals beyond their prime, both of which have lower reproductive value in a population, whereas antlerless removals by hunters result in a greater proportional take of adult females of prime age. Thus, wolf predation has less effect on reproductive rates and growth of populations.
I believe that wolves mainly kill weak and sick prey, which benefits ungulate breeding stock and results in healthier ungulate populations. Thus, wolves will not result in overall population declines of ungulates.	A number of scientific studies have shown that young-of-the-year (especially in larger prey like elk and moose), older animals, and diseased and injured animals are taken in greater proportion than healthy, prime-aged individuals (see Chapter 5, Section A). As noted in the background sections of the plan (Chapters 5, 14), observations from Idaho, Montana, and Wyoming, indicate that wolves do have localized impacts on ungulate abundance in some locations, but that they have a relatively small impact on ungulate abundance at a statewide level. Where wolf impacts occur, they are usually one of several factors causing a decline. These other factors often include habitat decline and loss, high human harvest (especially high antlerless take), drought, severe winters, and increased bear and cougar predation.
Wolves kill not only weak and sick prey, but many healthy prey in prime condition.	A number of scientific studies have shown that wolves tend to select more vulnerable and less fit prey, including young-of-the-year (especially in larger prey like elk and moose), older animals, and diseased and injured animals. Wolves do kill healthy, prime-aged individuals, but these animals are taken in lower proportion than their occurrence in populations.
Elk, deer and other game populations will be decimated or reduced by wolves.	As noted in the background sections of the plan (Chapters 5, 14), observations from Idaho, Montana, and Wyoming indicate that most elk and deer populations in these states remain at or above management objectives. Wolves have had some localized impacts on ungulate abundance in these states (see Chapter 5, Section B, for examples), but they have had a relatively small impact at a statewide level. Where wolf impacts occur, they are usually one of several factors causing a decline. These other factors often include habitat decline and loss, high human harvest (especially high antlerless take), drought, severe winters, and increased bear and cougar predation.
I am not aware of any evidence that ungulate populations already affected by winter loss, habitat loss, hunting, predation, and disease can maintain themselves after wolves arrive.	As noted in the background sections of the plan (Chapters 5, 14), observations from Idaho, Montana, and Wyoming indicate that most elk and deer populations in these states remain at or above management objectives. Wolves have had some localized impacts on ungulate abundance in these states (see Chapter 5, Section B,

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	for examples), but they have had a relatively small impact at a statewide level. Where wolf impacts occur, they are usually one of several factors causing a decline. These other factors often include habitat decline and loss, high human harvest (especially high antlerless take), drought, severe winters, and increased bear and cougar predation.
Wolves often kill their prey for the fun of it and often leave prey (both wild ungulates and livestock) uneaten. Wolves also target pregnant elk cows, eating or often just killing the unborn fetuses.	This comment is not accurate and anthropomorphizes the intentions of wolves. As with any predator, wolves must kill prey to survive. Wolves rarely surplus kill, with examples of this primarily involving domestic sheep. Wolves may leave prey uneaten or partially uneaten when disturbed by people or when intending to return later to the carcass to continue feeding on it.
Wolves are vicious cold-blooded killers and torture their prey. Prey of wolves die a painful and horrible death.	This comment is not accurate and anthropomorphizes the intentions of wolves and the deaths of their prey. As with any predator, wolves must kill prey to survive. Predators killing prey are a part of the natural world.
Wolves present a threat to ungulate health through the spread of tapeworm infections.	Wolves, coyotes, domestic dogs, and foxes probably all contribute to the infection of wild ungulates with the tapeworm <i>Echinococcus granulosus</i> in the northern Rocky Mountain states. Dogs associated with domestic sheep herds probably played a role in bringing the tapeworm to this region. Based on available information, the health risks associated with <i>Echinococcus granulosus</i> to wildlife is low. Heavy infections in ungulates may be related to poor body condition. For more information on tapeworm disease, see Chapter 7, Section E, of the wolf plan.
Moose will be adversely affected by wolves, which is not indicated in the plan.	Wolf impacts on moose have not been well studied in the northern Rocky Mountain states. As described in Chapter 5, Section B, of the wolf plan, wolves are believed to be a main factor in the recent decline of moose in Idaho's Lolo zone, but their impact on moose in other parts of Idaho is poorly known. Moose populations in some areas of Idaho may be more directly affected by habitat changes, harvest levels, or other causes. In Wyoming, wolves are considered a potential threat to some moose populations on their wintering ranges, but documented effects on such populations are lacking. A severe decline in moose has occurred in northwestern Wyoming since the late 1980s, but the decline has been primarily attributed to deteriorating habitat quality, with bear and wolf predation being a minor contributing factor.
Wherever wolves overlap with bighorn sheep populations, predation will definitely occur.	Bighorn sheep are not regularly taken by wolves in the northern Rocky Mountain states, probably because of little habitat overlap between the two species. Wolf predation on bighorn sheep in Washington is therefore expected to be minor.
The summary of wolf impacts on ungulates in other states is inaccurate and does not correctly summarize the declines that have occurred.	WDFW believes that Chapters 5 and 14 of the wolf plan provide an accurate account of wolf impacts to ungulates and hunting in other states.
Your analysis of what is happening with the Northern Yellowstone elk herd is inaccurate. It states that it is being caused by antlerless hunting. Antlerless hunting has been suspended for several years now. I think a new report identifies wolves as the real reason for the decline.	Chapter 5, Section B, of the wolf plan states that "wolf predation is one of several causes, along with high human harvest (including high antlerless take through 2005), drought, severe winters, and increased bear and cougar predation, contributing to a 72% decline (from about 16,800 to 4,600) in the northern Yellowstone elk herd from 1996 to 2010, which had existed at artificially high levels for decades due to declines and extirpations of large predators. As the wolf population expanded, it had an increasingly greater impact on this herd (Vucetich et al. 2005, White and Garrott 2005, Barber-

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	Meyer et al. 2008). However, bear predation on elk calves has greatly increased over the last decade or two in and around Yellowstone National Park and is currently having a larger impact on elk recruitment than wolf predation (Barber-Meyer et al. 2008). Cougar densities have also increased in the park over the past decade (Hebblewhite and Smith 2010). The wolf population has fallen from a peak of 174 wolves in 2003 to 97 wolves in 2010, mostly because of the smaller elk population (USFWS et al. 2011)." WDFW believes this information is accurate.
Information on wolf-ungulate interactions in Yellowstone is not very relevant to discussions of impacts in Washington. The ecosystems and mix of public and private are different.	Studies of wolf-ungulate interactions in Washington are not available because wolves are just starting to recolonize the state. WDFW therefore relied on information from other states with wolves, especially the northern Rocky Mountain states, to draw some basic conclusions on the impacts that wolves could have on ungulates in Washington. However, as this comment points out, there are important differences between Washington and these states, thus wolf impacts may differ from those seen elsewhere.
Hunters exaggerate the numbers of wild ungulates killed by wolves.	As noted in the background sections of the plan (Chapters 5, 14), most elk and deer populations in Idaho, Montana, and Wyoming remain at or above management objectives. Wolf predation has had some localized impacts on ungulate abundance and habitat use in these states (see examples in Chapter 5, Section B), but a relatively small impact at a statewide level.
Contrary to what is being communicated to the public by many hunters, elk numbers in Idaho have not been decreasing, as of 2009 and reported by the Rocky Mountain Elk Foundation. Elk are becoming more challenging to hunt by sportsmen as elk are pushed out of the valleys by wolves and into the mountains.	As noted in the background sections of the plan (Chapters 5, 14), most elk and deer populations in Idaho, Montana, and Wyoming remain at or above management objectives. Wolf predation has had some localized impacts on ungulate abundance and habitat use in these states (see examples in Chapter 5, Section B), but a relatively small impact at a statewide level. Recent research indicates that elk at Yellowstone National Park now spend more time in forested areas, on steeper slopes, and at higher elevations than before wolf reintroductions. Elk have also changed their herding behavior and movement rates in response to wolves. These types of behavioral changes in areas outside of parks suggest that hunters may need to adjust their own strategies for finding elk.
Deer and elk numbers are already lower than normal in my area of the state or throughout the state as a whole. Washington does not have the prey resources available to support numerous wolf packs.	The plan contains several analyses of potential suitable for wolves in Washington that included prey density as part of the analysis (see Chapter 3 Section A). Results of the analyses show varying but adequate amounts of estimated suitable habitat for wolves in the state. WDFW conducted population modeling of the Washington's wolf population using one of the analyses of potential suitable habitat noted above. This test indicated that state's wolf population has sufficient habitat available to expand to as many as 58 packs within 50 years.
Review of this chapter indicates that most elk herds in the state are below management objectives. Therefore, wolf recovery will be an additional factor that complicates meeting elk management objectives.	Updated information on elk herd sizes has been added to the recommended wolf plan. This new information shows that only 3 of the state's 10 elk herds are below management objective (3 are at objective, 2 are above objective, and 2 do not yet have an objective established). As noted in WDFW's game management plan for 2009-2015, wolves will be an additional factor to consider in managing elk in Washington.
The plan needs to provide greater detail on localized trends in ungulate herds throughout the state to better evaluate the potential impacts of	This level of detail can be found in other WDFW documents describing ungulate management in Washington, but goes beyond the scope of the recommended wolf plan.

Comment	Response
wolves.	
Ungulates are over-populated in my area. Wolf predation would help keep their numbers in check.	Wolf predation would probably help control some overpopulated herds of deer and elk in Washington depending on the localized situation. One situation where this might not occur would be with overabundant herds living in or close to urban areas.
Inadequate discussion in the plan of expected losses of deer and elk to wolves relative to other sources of mortality, such as hunting, dogs, other predators, vehicle collisions, disease, weather, and the impact of competition between livestock and ungulates for food.	Chapter 5 of the wolf plan contains some information on other sources of mortality to ungulates (e.g., see Table 12), but this type of information is not available for most game populations in Washington.
Collisions with vehicles are another significant source of mortality to ungulates in this state. Ungulate-vehicle collisions also cause many human mortalities and injuries in addition to high costs for vehicle repair. If we are concerned about declining ungulate populations, then a good place to begin reversing that trend is reducing the number of ungulate road-kills.	Various locations in Washington experience a high level of collisions between deer and cars. WDFW works with the Washington State Department of Transportation to design highways to reduce ungulate-car collisions. However, in many situations, there are few practical solutions to the problem. Wildlife fencing is often impractical, expensive to build and maintain, and often inhibits the movement of deer and other wildlife to important habitats.
The plan should point out that wounding losses caused by hunters is an important source of ungulate mortality because of the many unskilled and poorly motivated hunters.	Wounding loss is mentioned as a component of hunting-related mortality for elk in Chapter 5, Section C and Table 12, of the wolf plan. Four studies from Washington indicate that 5-14% of all adult and yearling elk die from hunting wounds and are not recovered by the hunter.
My family homesteaded in the Methow Valley in the early 1900s. Family history passed down says that few deer existed in the valley then and that they only became more common after white settlers began irrigating crops and bitterbrush became prevalent because of fire control.	Deer abundance was relatively low in the Methow Valley in the early 1900s. Early settlers in the area are known to have relied on deer and elk for sustenance, which reduced the abundance of both species. Irrigation of crops and other habitat changes helped deer numbers expand in the county, as did the enactment of state harvest regulations, which prevented further overharvest.
Wolves will have considerable adverse impacts at Washington's winter feeding stations for elk.	Chapter 5, Section D, of the wolf plan discusses possible impacts of wolves on elk at winter feeding stations. Observations from Wyoming and Idaho indicate that although wolves visit some winter feeding stations, but they have not caused significant losses of elk or other major problems. Incidences of surplus killing of elk are rare, and increased fence breaching by elk and increased fence-related injuries to elk have not been recorded. This suggests that impacts at Washington's winter feeding stations could also be minor.
Wolves shouldn't be allowed to occur at elk feeding stations and raise havoc. Those that do should be exterminated or moved out of state.	Chapter 5, Section D, of the wolf plan discusses possible impacts of wolves on elk at winter feeding stations. Observations from Wyoming and Idaho indicate that although wolves visit some winter feeding stations, but they have not caused significant losses of elk or other major problems. Incidences of surplus killing of elk are rare, and increased fence breaching by elk and increased fence-related injuries to elk have not been recorded. This suggests that impacts at Washington's winter feeding stations could also be minor.
Oppose WDFW's proposal to evaluate wolf-ungulate conflicts at winter feeding stations on a case-specific basis to determine appropriate management responses.	This comment does not suggest an alternative method for handling wolf-ungulate conflicts at winter feeding stations. Chapter 5, Section D, of the wolf plan discusses possible impacts of wolves on elk at winter feeding stations. Observations from Wyoming and Idaho indicate that although wolves visit some winter feeding stations, but they have not caused significant losses of elk or other

Comment	Response
	major problems. Incidences of surplus killing of elk are rare, and increased fence breaching by elk and increased fence-related injuries to elk have not been recorded. This suggests that impacts at Washington's winter feeding stations could also be minor.
The plan needs to give greater discussion about how WDFW will handle wolves coming to winter feeding grounds.	Chapter 12, Task 5.3.1, states that wolf-ungulate conflicts at winter feeding stations "will be evaluated on a case-specific basis to determine if management responses are needed and, if so, what the responses should be. In some cases, it may be desirable to develop a response plan in advance to address an anticipated conflict." Both the state and federal listed statuses of wolves at the time would likely factor into decisions made on responses. Non-lethal solutions would be emphasized while wolves are listed as endangered or threatened.
The plan should indicate that substantial wolf management will likely be needed in resolving adverse wolf-elk interactions at winter feeding stations, which present highly unnatural situations.	Chapter 5, Section D, of the wolf plan discusses possible impacts of wolves on elk at winter feeding stations. Observations from Wyoming and Idaho indicate that although wolves visit some winter feeding stations, but they have not caused significant losses of elk or other major problems. Incidences of surplus killing of elk are rare, and increased fence breaching by elk and increased fence-related injuries to elk have not been recorded. This suggests that impacts at Washington's winter feeding stations could also be minor.
Information should be included from Idaho's feeding stations. One is located along the south fork of the Payette.	Based on this comment, WDFW contacted the Idaho Department of Fish and Game to learn more about wolf-ungulate conflicts at winter feeding stations in Idaho. Winter feeding of elk and deer occurs on a much smaller scale in Idaho than in Wyoming. Most Idaho sites operate infrequently or on an emergency basis. Wolves do visit some winter feeding stations in Idaho, but have not caused significant losses or other problems at these locations to date (J. Rachael, pers. comm.).
Washington's elk are not native to this region; they were introduced in 1913. Because of this, they have no winter range and depend on winter feeding stations for nutrition. Wolves will decimate elk herds at winter feeding stations.	This comment is incorrect. Elk are indeed native to both sides of Washington and are thought to have occurred historically throughout all or most of the state. Thus, elk are adapted to winter conditions in Washington. Chapter 5, Section D, of the wolf plan discusses possible impacts of wolves on elk at winter feeding stations. Observations from Wyoming and Idaho indicate that although wolves visit some winter feeding stations, but they have not caused significant losses of elk or other major problems. Incidences of surplus killing of elk are rare, and increased fence breaching by elk and increased fence-related injuries to elk have not been recorded. This suggests that impacts at Washington's winter feeding stations could also be minor.
<b>Chapter 6 – Wolf interactions with other species</b>	
Wolves will reduce coyote numbers, which can benefit natural ecosystems.	As indicated in Chapter 6, Section A, of the recommended wolf plan, reestablishment of wolves has led to reductions in coyotes in some areas, like Yellowstone and Grand Teton National Parks, but not others. It remains unclear how strongly these same interactions will occur outside of protected areas, where wolf densities may be lower because of conflicts with humans. If coyote reductions due to wolves should occur in parts of Washington, this could possibly benefit some other small or medium-sized carnivores or some prey species, but this is difficult to predict with any certainty (see Chapter 2, Section C).

Comment	Response
Disagree with the coyote-wolf competitive interaction and that fewer coyotes could result in reduced impacts on ungulate populations	In Yellowstone and Grand Teton National Parks, wolves have been demonstrated to compete with coyotes and reduce their abundance (see Chapter 6, Section A). In areas occupied by wolves, transient coyotes experience higher mortality rates due to wolves and higher dispersal rates. One of the indirect effects of this has been higher survival rates among pronghorn fawns in protected areas (see Chapter 2, Section C). Therefore, wolf restoration could enhance other ungulate populations by reducing coyote predation rates on newborn ungulates, including mule deer and white-tailed deer. Whether these same interactions would occur in Washington is difficult to predict, but warrants further investigation.
Wolves will reduce the number of other predators through competition for food.	Information on this topic is presented in Chapter 6, Section A, of the recommended wolf plan. Wolves have long coexisted with a variety of other carnivore species in many different habitats. How different carnivores interact with wolves varies depending on the extent of dietary overlap, habitat, environmental conditions, and other factors. Research to date suggests that wolves can reduce certain carnivores (e.g., coyotes) locally, while others (e.g., grizzly bears) may benefit.
What will happen to other predators, including cougars? These large predators are already having enough trouble due to low prey numbers. There will be more cases of them coming to lower elevations and causing problems for people.	Information on this topic is presented in Chapter 6, Section A, of the recommended wolf plan. Few observations of direct wolf-cougar interactions have been reported, but the two species do occasionally kill each other. The degree of interactions between cougars and wolves probably varies over time and among areas with the greatest potential for interactions occurring at kill sites at lower elevations in winter. However, cougars have been observed moving away from kills to avoid wolf contact. Cougars may also exhibit shifts in their diet and habitat use in areas where they occur with wolves.
The killing of coyotes by wolves will allow house cats to proliferate near human habitation, which will result in greater cat predation on small birds and mammals.	WDFW is not aware of any reports of this happening in areas occupied by wolves in Idaho, Montana, Wyoming, or in the Great Lakes region. Wolves generally avoid living in areas close to human habitation, thus this situation seems unlikely to occur.
Wolves will benefit populations of scavenging wildlife, such as eagles, bears, foxes.	This statement is correct (see Chapter 6, Sections A and B, of the recommended plan).
The plan is overly optimistic in its assessment of impacts from wolves on listed species.	WDFW believes that wolf recovery is likely to have few significant adverse impacts to other listed species (see Chapter 6, Section C of the recommended wolf plan). Several listed and candidate species are likely to benefit from wolf recovery, especially those that scavenge, such as golden eagles, grizzly bears, and Cascade red foxes, which are likely to experience greater availability of ungulate carcasses provided by wolf kills. Mountain caribou could be adversely affected by wolf recovery. Caribou distribution in Washington is restricted primarily to the Salmo Priest Wilderness Area in northeastern Pend Oreille County. This area is characterized by high elevations and extensive closed canopy forests, and therefore supports relatively low densities of other ungulate prey that might attract wolves. For other listed species, few if any interactions with wolves have been observed in North America, making it difficult to predict the possible effects of wolf recovery on these species in Washington. Where conflicts between wolves and listed species do occur, the recommended plan calls for case-specific evaluations to determine what management responses

Comment	Response
What impact will wolves have on recovery of woodland caribou in the Selkirk Mountains? I believe the impacts on the caribou population could be greater than indicated in the wolf plan.	are needed (Chapter 12, Task 8).  Wolves have the potential to adversely affect mountain caribou, which in Washington are restricted primarily to the Salmo Priest Wilderness Area in northeastern Pend Oreille County. The area is characterized by high elevations and extensive closed canopy forests, and therefore supports relatively low densities of other ungulate species that might attract wolves. The U.S. Fish and Wildlife Service is proposing to investigate potential interactions between wolves and caribou in the Selkirk Mountains.
Lynx numbers will not grow as wolf numbers increase.	Few interactions between wolves and lynx have been documented in North America, making it difficult to predict the extent of impacts that might occur in Washington. In Montana, where lynx and a recovering wolf population co-exist, cougars accounted for almost all known cases of predation of lynx, with snow-free months being the most vulnerable period for lynx when lack of snow allows large predators access to high elevation habitats.
Olympic Marmots are being killed by coyotes. I think wolves being present in Olympic National Park would benefit the marmot population by reducing coyote numbers.	As stated in the recommended plan, wolf recovery could potentially benefit Olympic marmots by reducing coyote abundance, but such outcomes are difficult to predict with any certainty.
This chapter should include possible wolf impacts to Washington's reintroduced fisher population based on interactions in the Great Lake States. In Wisconsin, at least 1 fisher has been confirmed to be killed by wolves. Fisher populations in forested areas of the northern Great Lake States have declined in recent years and high wolf populations in this area may be reducing fisher abundance.	This information has been added to the recommended wolf plan. There have been few other published interactions between wolves and fishers, making it difficult to predict the possible effects of wolf recovery on fisher populations. Competition between wolves and fishers could result in wolves killing fishers, particularly when fishers scavenge carrion at ungulate kills in winter.
<b>Chapter 7 – Wolf-human interactions</b>	
Wolves represent a threat to people, including ranchers, children, and hikers.	Wild wolves generally fear people and rarely pose a threat to human safety. Attacks on humans by wolves are rare. In North America, there have been only two deaths caused by wolves since 1950 and injuries are also rare. Two broad summaries published in 2002 documented 28 reports of wolf aggression towards humans in North America from 1969 to 2001. Nineteen of these involved wolves habituated to humans and five involved the presence of domestic dogs. There have been no physical attacks on people in Idaho, Montana, or Wyoming from the time wolf recovery began in the 1980s until the present. However, because wolves are large carnivores capable of inflicting serious injury to people, wolves should be respected for their capabilities and humans should avoid close contact at all times. Chapter 7, Section A, of the recommended plan gives information on human safety around wolves, including how to prevent wolves from becoming habituated to people and what to do during a close encounter with a wolf.
Recovery of a pack-hunting carnivore frightens me. How do you compensate a family that loses a child during a wilderness hike?	Wild wolves generally fear people and rarely pose a threat to human safety. Attacks on humans by wolves are rare. In North America, there have been only two deaths caused by wolves since 1950 and injuries are also rare. Two broad summaries published in 2002 documented 28 reports of wolf aggression towards humans in North America from 1969 to 2001. Nineteen of these involved wolves habituated to humans and five involved the presence of

Comment	Response
	domestic dogs. There have been no physical attacks on people in Idaho, Montana, or Wyoming from the time wolf recovery began in the 1980s until the present. However, because wolves are large carnivores capable of inflicting serious injury to people, wolves should be respected for their capabilities and humans should avoid close contact at all times. Chapter 7, Section A, of the recommended plan gives information on human safety around wolves, including how to prevent wolves from becoming habituated to people and what to do during a close encounter with a wolf.
I believe that wolf attacks on humans are more common than indicated in the plan.	Information in the plan regarding the frequency of wolf attacks on humans is taken primarily from the published reports of Linnell et al. (2002) and McNay (2002a,b). These are considered accurate summaries of the number of wolf attacks on humans in North America from 1969 to 2001. These documented 28 reports of wolf aggression towards people during this period. Nineteen of these involved wolves habituated to humans and five involved the presence of domestic dogs. There have been only two human deaths caused by wolves in North America from 1950 to the present. Additionally, there have been no physical attacks on people in Idaho, Montana, or Wyoming from the time wolf recovery began in the 1980s until the present.
Wolves will be forced to move to low elevations during winter, and therefore will come into conflict with humans more frequently.	During the late fall and winter in many parts of Washington, wolves will likely follow prey species to lower elevations where more people may live. This could result in more wolf-human interactions, including conflicts. Nevertheless, wolves generally fear people and rarely pose a threat to human safety, thus few direct wolf-human conflicts are expected. The recommended wolf plan (Chapter 7, Section A) provides information on human safety around wolves, including how to prevent wolves from becoming habituated to people and what to do during a close encounter with a wolf.
What rights do I have if a wolf attacks me?	This information is presented in Chapter 7, Section A, of the recommended wolf plan. The federal Endangered Species Act allows a person to kill endangered wildlife in defense of his or her own life or the lives of others. A recently enacted state law also makes it permissible to kill wild animals engaged in the physical act of attacking a person (Chapter WAC 232-36-050(3)(a)). It is important to understand that wolves passing near, watching, or otherwise behaving in a non-threatening way near humans should not necessarily be considered as dangerous. Under these circumstances, wolves should perhaps be hazed using non-lethal methods, but use of lethal force is unneeded and illegal.
Support killing wolves during attacks to protect humans, regardless of wolf listing status. The plan should be clearer in indicating that people can kill a wolf that threatens their safety.	As mentioned in Chapter 7, Section A, of the recommended wolf plan, people have the right to kill a wolf that is attacking a person. The federal Endangered Species Act allows a person to kill endangered wildlife in defense of his or her own life or the lives of others. A recently enacted state law also makes it permissible to kill wild animals engaged in the physical act of attacking a person (WAC 232-36-050(3)(a)). It is important to understand that wolves passing near, watching, or otherwise behaving in a non-threatening way near humans should not necessarily be considered as dangerous. Under these circumstances, wolves should perhaps be hazed using non-lethal methods, but use of lethal force is

Comment	Response
	unnecessary and illegal.
Wolves are not a potential threat to human safety, including children.	While wolves rarely pose a threat to human safety, increasing wolf populations in the West and large numbers of humans visiting parks and other areas inhabited by wolves increase the opportunity for wolf-human encounters. Because wolves are large carnivores capable of inflicting serious injury to people, wolves should be respected for their capabilities and humans should avoid close contact at all times. Chapter 7, Section A, of the recommended plan gives information on human safety around wolves, including how to prevent wolves from becoming habituated to people and what to do during a close encounter with a wolf.
Presence of wolves, without any attack on humans, should be recognized as non-threatening and lethal control should not be allowed.	Chapter 7, Section A, already contains a statement that wolves passing near, watching, or otherwise behaving in a non-threatening way near people should not necessarily be considered as dangerous. Under these circumstances, wolves should perhaps be hazed using non-lethal methods, but use of lethal force is unnecessary and illegal.
I have been in the vicinity of wolves, but have never feared them.	Comment noted.
Why does the plan offer compensation for livestock losses but nothing for people that will be killed or injured by wolves?	Compensation programs for human deaths or injuries do not exist for attacks caused by any wildlife species in the U.S. Additionally, the lack of any wolf attacks on people in the lower 48 states in recent decades means that such a program is not needed for wolf attacks. Current or recent wolf-related compensation programs in the western U.S. were established only for the purpose of reimbursing livestock depredation by wolves. These programs are intended to shift the economic burden of wolf recovery away from livestock producers to those who support wolf recovery or to taxpayers.
Wolves are a threat to pets.	Situations where wolves and domestic dogs encounter each other can result in deaths and injuries to the dogs. Dogs used for livestock guarding, herding, and hunting are most vulnerable to attack. Most attacks on dogs in Idaho, Montana, and Wyoming in recent years occurred in remote areas away from homes. Domestic dogs are also vulnerable to attack or killing by a variety of predators other than wolves, such as coyotes, cougars, bears, and feral dogs. Chapter 7, Section C, of the recommended wolf plan gives details on ways to avoid wolf attacks on dogs. Wolf depredation on other types of pets such as cats has not been reported from Idaho, Montana, and Wyoming, and therefore is not expected in Washington.
Backcountry recreation with pet dogs will become dangerous if wolves populate our forests.	Recreationists visiting occupied wolf range will have a greater likelihood of encountering wolves in the wild. Chapter 7, Section C, of the recommended plan recommends that hikers consider leaving their dogs at home when visiting areas known to be occupied by wolves. Hikers with dogs should learn to recognize wolf sign and bring a leash to restrain their dogs if wolf sign is found. If an encounter with a wolf takes place, the dog should be brought to heel at the person's side or leashed as quickly as possible. Standing between the dog and the wolf often ends the encounter. To avoid risk of personal injury, a person should not attempt to break up a physical fight between a wolf and a dog. Chapter 7, Section C, provides steps that houndsmen can take to reduce interactions between their dogs and wolves. These include

Comment	Response
	releasing hounds only on fresh sign to avoid longer chases, avoiding releases in areas with fresh evidence of wolves, yelling or making noise when releasing hounds and going to the tree, reaching hounds at trees as quickly as possible so they are not unattended for long periods, leashing dogs at trees to control them, and placing bells or beeper collars on hounds.
Wolves are not a threat to pets.	Wolves can be a potential threat to domestic dogs, especially those used for livestock guarding, herding, and hunting. Other types of pet dogs can also be at some risk when accompanying their owners into areas occupied by wolves and allowed to run free. Most attacks on dogs in Idaho, Montana, and Wyoming in recent years occurred in remote areas away from homes and have been largely limited to livestock guarding, herding, and hunting dogs. Measures for avoiding attacks on pet dogs appear in Chapter 7, Section C, of the recommended plan. Wolf depredation on other types of pets such as cats has not been reported from Idaho, Montana, and Wyoming, and therefore is not expected in Washington.
Domestic pets are already killed by other wildlife. The arrival of wolves should not be treated any differently.	WDFW encourages pet owners to take responsible steps to avoid depredations on any pets by wildlife. Chapter 7, Section C, of the recommended plan gives guidance for what recreationists and houndsmen, respectively, can do to reduce interactions between their dogs and wolves.
The plan should give more attention to addressing potential conflicts between wolves and domestic dogs.	Measures for avoiding wolf attacks on hunting hounds and other dogs appear in Chapter 7, Section C, of the recommended plan. Additional suggestions for avoiding such attacks were added to this part of the wolf plan.
Support killing wolves during attacks to protect dogs, regardless of wolf listing status.	Killing wolves to protect dogs being attacked is not allowed under the recommended wolf plan, with the exception of livestock guarding and herding dogs (see Chapter 4, Section E). Practices that dog owners can take for avoiding wolf attacks on pet dogs, including hunting hounds, have been expanded in the plan and appear in Chapter 7, Section C.
Support lethal control in the case of dogs being attacked after wolves reach threatened status.	Killing wolves to protect dogs being attacked is not allowed under the recommended wolf plan, with the exception of livestock guarding and herding dogs (see Chapter 4, Section E). Practices that dog owners can take for avoiding wolf attacks on pet dogs, including hunting hounds, have been expanded in the plan and appear in Chapter 7, Section C.
Oppose use of lethal control for wolves in the act of attacking pet dogs by private citizens on private and public lands during sensitive status.	Killing wolves to protect dogs being attacked is not allowed under the recommended wolf plan, with the exception of livestock guarding and herding dogs (see Chapter 4, Section E). Practices that dog owners can take for avoiding wolf attacks on pet dogs, including hunting hounds, have been expanded in the plan and appear in Chapter 7, Section C.
Oppose lethal control of wolves attacking dogs while on public lands regardless of state status.	Killing wolves to protect dogs being attacked is not allowed under the recommended wolf plan regardless of land ownership, with the exception of livestock guarding and herding dogs (see Chapter 4, Section E). Practices that dog owners can take for avoiding wolf attacks on pet dogs, including hunting hounds, have been expanded in the plan and appear in Chapter 7, Section C.
Wolves attacking pet dogs on public lands should not be punished because they are defending their territories.	This comment is correct in that wolves attacking dogs are most likely defending pups at rendezvous sites or dens or defending their territories rather than trying to prey on them. Killing wolves to protect dogs under attack is not allowed under the

Comment	Response
	recommended wolf plan regardless of land ownership, with the exception of livestock guarding and herding dogs (see Chapter 4, Section E). Practices that dog owners can take for avoiding wolf attacks on pet dogs, including hunting hounds, have been expanded in the plan and appear in Chapter 7, Section C.
Compensation should be paid for wolf depredation of pet dogs, including hunting dogs.	The recommended wolf plan proposes compensation for wolf depredation on livestock herding and guarding dogs, but not hunting dogs or other pet dogs. From 2000 to 2008, wolves in Idaho and Montana were responsible for one to two fatal attacks on hunting hounds annually in most years. Except for guarding/herding dogs (see Table 5), very few other types of pet dogs have been killed. WDFW expects similar low rates of wolf-related mortalities for non-guarding/herding dogs in Washington and believes these do not warrant compensation. Payments for these dog types would be an extra burden on funding for livestock compensation. Houndsmen and recreationists should take the preventative measures described in Chapter 7, Section C, to reduce interactions between their dogs and wolves.
Support the draft plan's recommendation that compensation should not be paid for wolf depredation of pet dogs, including hunting dogs.	The recommended wolf plan proposes compensation for wolf depredation on livestock herding and guarding dogs, but not hunting dogs or other pet dogs. From 2000 to 2008, wolves in Idaho and Montana were responsible for one to two fatal attacks on hunting hounds annually in most years. Except for guarding/herding dogs (see Table 5), very few other types of pet dogs have been killed. WDFW expects similar low rates of wolf-related mortalities for non-guarding/herding dogs in Washington and believes these do not warrant compensation. Payments for these dog types would be an extra burden on funding for livestock compensation. Houndsmen and recreationists should take the preventative measures described in Chapter 7, Section C, to reduce interactions between their dogs and wolves.
Wolf-dog hybrids and pet wolves should be prohibited in Washington. WDFW should work with other agencies to propose legislation to ban ownership of these animals in the state.	Pet wolves are already prohibited in Washington under state law RCW 16.30. Legal efforts to similarly ban wolf-dog hybrids throughout the state have been attempted over the past few years, but the legislation has failed to pass. WDFW will continue to support legislative efforts to outlaw wolf-dog hybrids in the state. This is because hybrids running free can complicate wolf recovery by being misidentified as wild wolves when threatening human and livestock safety and by confusing efforts to monitor the status of wild wolf populations. Although considered a small risk, hybrids may interbreed with wild wolves and thereby contaminate the wolf gene pool.
Hybrid ownership should be heavily controlled.	Possession of wolf-dog hybrids as pets should be discouraged because of public safety concerns (see Chapter 7, Section E, of the recommended wolf plan). Hybrids running free can also complicate wolf recovery by being misidentified as wild wolves when threatening human and livestock safety and by confusing efforts to monitor the status of wild wolf populations. Although considered a small risk, hybrids may interbreed with wild wolves and thereby contaminate the wolf gene pool. For these reasons, WDFW supports legislative efforts to outlaw wolf-dog hybrids in the state.
Ownership of wolf-dog hybrids should require a license and owners should be evaluated for	There are no statewide requirements for licensing of wolf-dog hybrids. City and county jurisdictions may have their own

Comment	Response
whether they can provide proper care of the animal.	restrictions. WDFW supports legislative efforts to outlaw wolf-dog hybrids in the state.
Concern that dogs will significantly "contaminate" the wolf gene pool.	Two recent studies (vonHoldt et al. 2008, 2010) from Idaho, Montana and Wyoming did not reveal any evidence of genetic material from dogs in the wild wolf populations in these states. Therefore, interbreeding between dogs and wild wolves and alteration of the genetic makeup of wolves is currently not a major concern of wolf managers in Washington.
Wolves present a threat to humans because of possible tapeworm infection.	People rarely become infected with the type of hydatid disease caused by the tapeworm <i>Echinococcus granulosus</i> , which is associated with canids and ungulates. People can obtain the disease by drinking water or eating vegetation contaminated with tapeworm eggs. Infections can also result from handling contaminated canid fur or scat, and then transferring the eggs to the person's mouth by touching the face or eating before adequate hand washing. The disease is extremely unlikely to be spread by handling ungulate capes or meat, unless those parts are contaminated with canid feces and handlers do not use good basic hygiene. People cannot be infected by eating the cysts found in ungulates. These tapeworms are neither wind-borne nor transmissible to humans in any way other than direct ingestion of eggs. To avoid infection, people should practice good hygiene when handling live wild animals, dead wild animals, their secretions, or their products. Dogs should not be allowed to feed on or scavenge ungulates, or allowed to roll in canid scat in areas where the tapeworm occurs. People should always wash their hands after handling dogs with access to ungulate carcasses and regularly deworm the dogs. Information on the tapeworm and its infection of humans was added to a new section of the recommended wolf plan (Chapter 7, Section E).
<b>Chapter 8 – Land management</b>	
Oppose wolf-related land use restrictions of any kind.	State and federal restrictions on human development and other land use practices have not been needed to achieve wolf recovery in Idaho, Montana and Wyoming, and are not expected to be necessary in Washington (see Chapter 8 of the recommended plan). The Washington Forest Practices Rules contain a provision for reviewing forest practices that occur near wolf dens and provides seasonal closures for various forest harvesting activities near dens. The plan recommends that this rule be reviewed and modified to reflect that prevention of excessive disturbance near occupied dens is needed only during the active wolf denning period (see Chapter 12, Task 2.3.2).
While wolves are listed as endangered or threatened, grazing, logging, and other commercial activities should be prohibited on public lands occupied by wolves.	State and federal restrictions on human development and other land use practices have not been needed to achieve wolf recovery in Idaho, Montana and Wyoming, and are not expected to be necessary in Washington (see Chapter 8 of the recommended wolf plan). The Washington Forest Practices Rules contain a provision for reviewing forest practices that occur near wolf dens and provides seasonal closures for various forest harvesting activities near dens. The wolf plan recommends that this rule be reviewed and modified to reflect that prevention of excessive disturbance near occupied dens is needed only during the active wolf denning period (see Chapter 12, Task 2.3.2).

Comment	Response
Support temporary road closures and other land use restrictions to benefit wolf recovery. These would help protect wolf dens and rendezvous sites, and would also reduce disturbance to ungulate populations. The plan should provide greater detail on WDFW's collaboration with other land management agencies and timber companies on the use of road closures to benefit wolf recovery.	State and federal restrictions on human development and other land use practices have not been needed to achieve wolf recovery in Idaho, Montana and Wyoming, and are not expected to be necessary in Washington (see Chapter 8 of the recommended wolf plan). The Washington Forest Practices Rules contain a provision for reviewing forest practices that occur near wolf dens and provides seasonal closures for various forest harvesting activities near dens. The wolf plan recommends that this rule be reviewed and modified to reflect that prevention of excessive disturbance near occupied dens is needed only during the active wolf denning period (see Chapter 12, Task 2.3.2).
On the Olympic Peninsula, federal lands tend to be older forests and are surrounded by younger forests on private and state forest lands. This means that ungulate populations will be more abundant on private and state forestlands, and will attract wolves to these land ownerships with corresponding land use restrictions.	Restrictions on forestry on private and state lands have not been needed to achieve wolf recovery in Idaho, Montana and Wyoming, and are not expected to be needed in Washington (see Chapter 8 of the recommended wolf plan). The Washington Forest Practices Rules contain a provision for reviewing forest practices that occur near wolf dens and provides seasonal closures for various forest harvesting activities near dens. The wolf plan recommends that this rule be reviewed and modified to reflect that prevention of excessive disturbance near occupied dens is needed only during the active wolf denning period (see Chapter 12, Task 2.3.2).
WDFW and appropriate federal land management agencies must also include permittees in discussions regarding livestock grazing permits.	Responsibility for management of public lands resides with the various federal and state administering agencies. WDFW has no legal authority to implement restrictions on lands it does not manage, and land management agencies can and may adopt seasonal or localized area restrictions independently from WDFW. However, these agencies would likely consult with WDFW on issues pertaining to land management actions involving wolves. Presumably, federal and state agencies would discuss any changes in the management of grazing allotments with affected permittees.
Public lands are the property of all the public, not just the ranchers who lease and degrade it through their activities. Public lands should be managed to support healthy wolf populations.	Responsibility for management of public lands resides with the various federal and state administering agencies. WDFW has no legal authority to implement restrictions on lands it does not manage, and land management agencies can and may adopt seasonal or localized area restrictions independently from WDFW. However, these agencies would likely consult with WDFW on issues pertaining to land management actions involving wolves.
The plan needs to clarify how public lands will be managed for wolves.	Responsibility for management of public lands resides with the various federal and state administering agencies. WDFW has no legal authority to implement restrictions on lands it does not manage, and land management agencies can and may adopt seasonal or localized area restrictions independently from WDFW. However, these agencies would likely consult with WDFW on issues pertaining to land management actions involving wolves. Regarding lethal control of wolves on public lands, the plan states that this type of management may be necessary to resolve wolf-livestock conflicts and other types of conflicts.
Outdoor recreationists will find extreme restrictions put on them by land management agencies that limit their ability to access areas occupied by wolves.	WDFW does not believe that restrictions of this kind will occur. Loss of access to outdoor recreationists has not occurred in Idaho, Montana, and Wyoming because of wolf recovery.
Wolf recovery will result in land use restrictions being placed on livestock owners on the Olympic Peninsula.	WDFW does not believe that restrictions of this kind will occur. State and federal restrictions on human development and other land use practices on private lands have not been needed to

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	achieve wolf recovery in Idaho, Montana and Wyoming, and are not expected to be necessary in Washington (see Chapter 8 of the recommended plan).
WDFW needs to have local support from landowners if they attempt to place restrictions on private lands.	State and federal restrictions on human development and other land use practices on private lands have not been needed to achieve wolf recovery in Idaho, Montana and Wyoming, and are not expected to be necessary in Washington (see Chapter 8 of the recommended plan).
Will efforts to improve habitat connectivity for wolves increase land use restrictions on property owners?	State and federal restrictions on human development and other land use practices on private lands have not been needed to achieve wolf recovery in Idaho, Montana and Wyoming, and are not expected to be necessary in Washington (see Chapter 8 of the recommended plan).
Oppose WDFW buying private land to benefit wolf recovery. Working ranches should be maintained.	Conservation easements and agreements are two mechanisms to conserve lands and maintain working landscapes that do not include purchase of the land. It is very unlikely that any land conservation actions of this type (or land acquisitions from willing landowners) would be conducted solely for wolf conservation. Instead, they would need to provide benefits to multiple species, such as other endangered and threatened species, carnivores, ungulate populations, etc.
The report denies that WDFW has legal authority for any restrictions on private lands, but I suspect WDFW does have authority for restrictions on avoiding incidental take of state-listed endangered and threatened species.	Under state law, it is illegal to hunt, fish, possess, maliciously harass or kill endangered fish or wildlife, or maliciously destroy the nests or eggs of endangered fish or wildlife (RCW 77.15.120). It is also illegal to hunt, fish, possess, or maliciously kill protected fish or wildlife, or possess or maliciously destroy the eggs or nests of protected fish or wildlife (RCW 77.15.120). Both provisions apply to private and public land. WDFW has limited authority to protect fish and wildlife habitat under state law.
<b>Chapter 9 – Information and education</b>	
Unbiased education programs are needed about wolves.	A well-informed public is essential to wolf conservation. WDFW believes it is crucial that wolves and wolf management issues be portrayed in an objective and unbiased manner, and that the public must receive accurate information on the species.
Expanded education programs are needed to inform people about all aspects of wolves, including the low risk they pose to human safety, how to protect livestock and pets, how to react to wolves when encountered, penalties for poaching, etc.	As described in Chapter 9 and Chapter 12, Task 9, of the recommended plan, an active and expanded outreach program targeting a number of different groups in the public will best benefit wolf conservation.
Concerned that WDFW's wolf education programs will be strongly biased toward the need to recover wolves and the value of this species.	A well-informed public is essential to wolf conservation. WDFW believes it is crucial that wolves and wolf management issues be portrayed in an objective and unbiased manner, and that the public receives accurate information on the species.
Oppose education programs that will portray wolves as wonderful animals that need to be recovered.	A well-informed public is essential to wolf conservation. WDFW believes it is crucial that wolves and wolf management issues be portrayed in an objective and unbiased manner, and that the public receives accurate information on the species.
Because Defenders of Wildlife was one of the litigants against delisting of wolves in other western states, it is inappropriate that WDFW has information from this organization on its website.	This comment refers to a guidance document on WDFW's website titled "Livestock and Wolves: A Guide to Nonlethal Tools and Methods to Reduce Conflicts," which was published by Defenders of Wildlife. This publication uses the experiences, insights and recommendations of livestock producers, wildlife conservationists,

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	university researchers, and biologists to describe proactive livestock protection tools and non-lethal methods and strategies available to reduce livestock losses to wolves. This information is relevant to livestock producers regardless of its source.
<b>Chapter 10 - Research</b>	
Wolves have been studied all over the world, therefore research should not repeat studies that have already been done.	Extensive research on wolves and their impacts has been conducted in recent decades in Idaho, Montana, and Wyoming, and has provided excellent information for directing wolf recovery and management in those states. This body of work will be especially useful in guiding future wolf studies in Washington. In some instances, the results of this research will be directly applicable to Washington, making it unnecessary to repeat some studies. However, in other cases, similar studies will be needed in this state because of differences in habitat quality, prey availability, human densities, and other characteristics. This research will help wildlife managers better understand wolves and their impacts on other species in Washington. It will also guide the development of long-term conservation and management objectives for wolves in the state.
The only necessary research is to document total numbers of packs and individuals, and their impacts on ungulate populations and hunter harvest levels.	Additional research is needed to help wildlife managers better understand wolves and their impacts on other species in Washington. It will also guide the development of long-term conservation and management objectives for wolves in the state. Chapter 12, Task 11, of the recommended wolf plan provides topics for research that will be conducted by WDFW, other federal and state agencies, tribes, universities, and other scientists. This work will rely on cooperative partnerships among these entities.
Additional research on wolves is needed.	WDFW believes that additional research is needed to help wildlife managers better understand wolves and their impacts on other species in Washington. This work will also guide the development of long-term conservation and management objectives for wolves in the state.
Baseline research should be conducted prior to the arrival of wolves or in the early stages of their recovery to help assess the ecological effects resulting from wolf recovery.	Collecting baseline information will be helpful in assessing the ecological effects of wolf recovery. Depending on the research question, some of this baseline information has very likely already been collected by WDFW or other entities during other studies.
Believe that wolf research will be manipulated to further WDFW's wolf agenda.	Most wolf research in Washington will be conducted by researchers not affiliated with WDFW. Their research would follow scientific principles and their results would be independent from WDFW's wolf conservation and management goals.
<b>Chapter 11 – Reporting and evaluation</b>	
How will WDFW ensure that the latest scientific research is used to manage wolf recovery?	As noted in Chapter 11 of the recommended wolf plan, an adaptive management approach will be used so that new information can be incorporated into management strategies.
WDFW should prepare a regular report to update the public on the status of the wolf in Washington.	As noted in Chapter 12, Task 12.2, WDFW will produce an annual report summarizing all activities and results of wolf conservation and management that occurred in Washington during the previous year. Reports will provide summaries of monitoring with information on population status, distribution, reproduction, population growth, and mortality; documented depredation on domestic animals and management responses; law enforcement; research; outreach; and other activities pertinent to wolves. The

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	annual report will be available to the public on the WDFW website and provided to the Washington Fish and Wildlife Commission, elected officials, and others requesting copies.
<b>Chapter 12 – Goals, objectives, strategies and tasks</b>	
WDFW may need to hire more than 2 wolf specialists to provide technical assistance to ranchers and conduct many other duties.	Chapter 12, Task 1.1, of the wolf plan states that a wolf specialist will be hired. Whether WDFW would need to hire more than one wolf specialist would be evaluated as wolf recovery progresses. One option for avoiding this might be to contract with USDA Wildlife Services for additional assistance.
The plan should provide more detail on how WDFW will track distribution and abundance of wolf packs and total wolf numbers to assess current population status. Radio collaring members of each wolf pack will be an important element of monitoring wolf distribution and abundance.	Chapter 12, Task 1, of the wolf plan provides greater detail on how WDFW and its partners will monitor wolf abundance and distribution. Radio telemetry will be an important tool in population monitoring while wolves are listed (Task 1.3.1). Monitoring results will be available to the public in annual reports produced by WDFW (Chapter 12, Task 12.2).
How will WDFW adequately monitor wolves given recent and projected budget reductions? Cooperative monitoring with other agencies or groups would provide efficiencies and cost savings.	Future funding is difficult to predict under the current budget constraints. Despite recent budget reductions, wolves will remain a priority for WDFW. Several ways to reduce the costs of monitoring and overcome staffing limitations are to partner with other agencies and entities (Task 10) and to use new, more efficient survey methods as they are developed (Task 1.2.1).
I would never report a wolf sighting on my land because some official or environmentalist would try to take my rights away as a landowner.	Comment noted.
How will genetic variation be monitored to ensure a healthy wolf population?	Genetic monitoring is addressed in Chapter 12, Tasks 1.2.1, 1.3.4, and 11.2 of the recommended plan. Standard up-to-date methods and analyses of genetic variation will be used.
Support the idea of moving wolves for promoting genetic diversity, as mentioned in Chapter 12, Task 1.5.	Comment noted.
WDFW should collaborate with the tribes, other federal and state agencies, NGO's (e.g., the National Park Service, Defenders of Wildlife, Conservation Northwest), and volunteers (i.e., students, sportsmen) to assist in wolf recovery. These partnerships will provide cost savings and educational benefits.	Partnering with other agencies and entities can lead to cost savings and improved efficiencies as well as other benefits such as educational opportunities. Partners that can assist in monitoring are mentioned in Chapter 12, Tasks 1, 10, and 11, and in Chapter 13.
A task should be included that aids the cultural revitalization of Native American communities through the recovery of wolves.	WDFW would be willing to assist any tribe with projects of this type.
Research should be conducted to study the impacts of wolves on ungulate populations, recreational hunting opportunity, and livestock in Washington.	Research pertaining to this comment is already recommended in Chapter 12, Task 11, of the recommended wolf plan.
Research on the potential ecosystem role of wolves outside of national parks should be conducted to demonstrate that the ecosystem benefits are widespread.	Research to this type would be valuable in any western state with wolves, including Washington, and would fall under that recommended in Chapter 12, Task 11.5, of the recommended wolf plan.
Research should be conducted on the genetic differences between Rocky Mountain and "Coastal/Cascade" wolves.	One of the research tasks in the plan (Chapter 12, Task 11.2) is to determine various genetic aspects of the wolf populations that become reestablished in Washington.

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WDFW should consider creating a scientific review panel (including biologists, economists, and social scientists) that regularly reviews proposed management actions in a timely manner. This could greatly improve public and managerial confidence in proposed wolf management activities.	WDFW has its own scientific review process, but also uses outside scientific review panels from time to time to assist with evaluation of issues and related science. A review panel of this type could be something to consider in the future in regards to wolf management in Washington.
WDFW should provide the Washington Fish and Wildlife Commission and general public with regular updates on the status of wolf management in the state. Quarterly updates would be appropriate.	As stated in Chapter 12, Task 12.2, of the recommended plan, WDFW will produce an annual report summarizing all activities and results of wolf conservation and management occurring in Washington during the previous year. The annual report will be available to the public on the WDFW agency website and provided to the Fish and Wildlife Commission, elected officials, and others requesting copies. WDFW will provide the Commission with more frequent updates on wolves as requested.
WDFW should be required to meet with agricultural stakeholder groups and the Legislature's agricultural and natural resource committees annually to report on numbers of wolves and stages of recovery for each region.	WDFW staff from headquarters and the regions have already been meeting with affected stakeholders and legislators during the development of the recommended wolf plan. Meetings and presentations of this type will continue after the plan is finalized. Additionally, WDFW will produce an annual report summarizing wolf conservation (including wolf pack distribution and size) and management activities that have occurred during the previous year (Chapter 12, Task 12.2). This report will be available to the public on the WDFW agency website and provided to the Fish and Wildlife Commission, elected officials, and others requesting copies.
The plan should provide the strongest possible protections to wolves as they make their return to the state.	Chapter 12, Task 2, of the recommended wolf plan addresses the various protective actions that WDFW will engage in to minimize wolf mortality during recovery.
WDFW should provide legally binding enforcement protections to prevent another extinction of wolves from the state.	State law RCW 77.15.120 already protects endangered species from killing, malicious harassment, hunting, and possession. Enforcement activities to minimize wolf mortality from illegal killing will be implemented by enforcement staff from WDFW, U.S. Fish and Wildlife Service, and other agencies (see Chapter 12, Task 2.2.2).
What will be done to limit wolf poaching? For example, wildlife poaching is extensive on the Olympic Peninsula and will put wolves at risk without adequate enforcement by WDFW.	Information pertaining to the prevention of illegal killing of wolves is provided in Chapter 12, Task 2.2.2, of the recommended wolf plan. Enforcement efforts will be greatly enhanced by the public's assistance in reporting illegal activities involving wolves.
As many wolves as possible should be radio-tagged to help enforcement officers find people that kill wolves illegally.	Intensive radio-tagging would be used primarily for monitoring wolf distribution, abundance, and identifying sources of mortality (including from illegal killing) while the species remains listed. Monitoring of this type could help enforcement officers with some wolf poaching investigations, but the extent to which this would happen and whether it would lead to increased arrests are unknown.
WDFW should strongly consider closing the coyote season during the firearm season for ungulates while wolves are listed. This will prevent "accidental" mortality of wolves "misidentified" as coyotes.	The recommended wolf plan does not propose this action. Chapter 12, Tasks 2.2.2 and 2.2.3, mention various activities that will be implemented to minimize deliberate and accidental killing of wolves during listed status. If excessive wolf mortality occurs during the ungulate hunting season, WDFW would review options for reducing losses. These might include increased public outreach and education and increased patrolling by enforcement officers, but could also include possible consideration of closing coyote

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	hunting in some areas.
Enforcement alone will not be the only factor needed to ensure wolf recovery. Various methods for building public tolerance of wolves are vital as well.	This comment is correct, as described in Chapter 12, Task 2.2.2, of the recommended wolf plan.
The plan calls for minimizing wolf mortality from lethal control. However, Dr. David Mech has written “28-50% of a wolf population must be killed by humans per year (on top of natural mortality) to even hold a wolf population stationary. Indeed, the agencies outside the Northern Rocky Mountain states, which are seeking to reduce wolf populations, try to kill 70% per year (Fuller et al. 2003).”	The numbers given in this comment were previously thought to apply to wolf populations that were already well established. However, recent research by Creel and Rotella (2010) indicates that maximum removal rates per year should not exceed 22-24% of an established wolf population. Even these reduced rates should not be applied to a population that is in the early stages of attempting to recover. As discussed in Chapter 12, Task 2.2.1, of the recommended plan, limitations on lethal control of wolves are desirable early in recovery to promote expansion of the population. One of the main premises of the plan is that lethal control of wolves needs to be most restrictive during state endangered and threatened statuses, but could be somewhat more relaxed during sensitive status.
WDFW should expand the protection of wolf habitat near wolf packs. WDFW should treat den site locations as sensitive data and not release these data to the general public or landowners.	Wolves are habitat generalists, thus increased habitat protection and stricter land use practices have not been needed to achieve wolf recovery in other states. WDFW already treats locations of wolf den sites as sensitive data (i.e., it will not release information on the locations of dens to the general public). However, under Chapter 12, Task 2.3.1, WDFW would provide landowners with information on locations of dens to help avoid possible conflicts that could occur and to avoid possible disturbance of the site.
This chapter should provide greater detail on law enforcement activities to reduce illegal kill.	Chapter 12, Task 2.2.2, describes enforcement activities that will aid in reducing the illegal killing of wolves. Providing additional detail about this activity is not necessary for a conservation and management plan of this type.
Efforts to translocate wolves to U.S. Forest Service lands will require early coordination with the Forest Service.	As noted in Chapter 12, Task 3.3, any consideration of translocation of wolves to lands of the U.S. Forest Service or another agency would involve extensive consultation with that agency from the onset of consideration and planning.
Rapid response times (i.e., within 24 hrs) to reports of wolf depredation involving livestock will be critical. How many WDFW wolf specialists will be available to ensure speedy response times?	A rapid response is critical to determining the cause of a livestock mortality, whether it be from wolves, other predators, or other causes. The recommended plan indicates that on-site inspections will be made by WDFW or USDA Wildlife Services within 24 hours of the incident being reported (see Chapter 12, Task 4.2.3). This response time should be sufficient for making correct determinations. WDFW will have sufficient trained staff available to conduct these investigations and will also contract with USDA Wildlife Services to provide assistance of this type.
WDFW should supply or loan equipment like fladry, turbo fladry, lighting sensors, alarm systems, and other tools to ranchers to deter wolves.	Under Chapter 12, Task 4.1.2, of the recommended plan, WDFW will assist livestock owners with obtaining equipment of this type, but producers would need to pay for this with their own money. However, under Task 4.3.4, WDFW will attempt to secure a funding source for implementing proactive deterrents, which will provide greater amounts of reimbursements for these types of equipment. Defenders of Wildlife has announced its intention to expand its program to reimburse livestock producers in the West for proactive deterrents, which could benefit some producers in Washington.
WDFW could develop a mobile response team of	An example of a successful range rider program is described in

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volunteer range riders to alleviate conflicts for livestock producers.	Chapter 4, Section B, of the wolf plan. A volunteer program of the type mentioned in this comment is worth investigating and could be managed by a partner organization or perhaps WDFW.
The plan needs a more detailed strategy of how ungulate habitat will be managed.	The recommended wolf plan states that ungulate populations and their habitat will be managed through the implementation of WDFW's game management plans (see Chapter 5, Section F; Chapter 12, Task 5.2.1). These plans contain more detailed information on desired habitat management for ungulates, thus inclusion of this type of information into the wolf plan is not necessary.
This section indicates that better habitat management, flexibility in harvest strategies, and increased prevention of poaching are needed to sustain healthy ungulate populations. WDFW's current activities have generally been unsuccessful to date in realizing any meaningful improvements. What will WDFW do in the future to accomplish these objectives that it isn't already doing?	Improvements in habitat management could be achieved by continuing to work with other land management agencies. Protection of important ungulate habitats, such as winter habitat, remains a priority. WDFW's Game Management Plan 2009-2015, various elk herd plans, and the White-tailed Deer Management Plan all describe different types of habitat enhancement that are needed for different ungulate species.
Support increased habitat management to benefit both ungulate populations and wolves.	As noted in Chapter 12, Task 5.2.1, habitat maintenance and enhancement of habitat for ungulates will be a key part of maintaining ungulate abundance as wolves recover.
The ability to improve habitat for ungulates is limited by land management activities that can take place in those areas and by opposition from stakeholders seeking a "natural" landscape. Wolf recovery should be based on currently available habitat to support prey, because those habitats should already be managed for healthy ungulate populations. The generalization that habitat management will help ungulate herds is likely not true, especially if herds are limited by other factors. The plan presents too simplistic and too optimistic of a view of habitat management for ungulates. Furthermore, habitat improvements will take at least several years to provide benefits to ungulates, whereas wolf predation may generate rapid population declines in ungulates.	Improvements in habitat management could be achieved by continuing to work with other land management agencies. Protection of important ungulate habitats, such as winter habitat, remains a priority. WDFW's Game Management Plan 2009-2015, various elk herd plans, and the White-tailed Deer Management Plan all describe different types of habitat enhancement that are needed for different ungulate species.
The plan should recommend that grazing allotments on public land be closed so that more forage is available to deer and elk. This will enhance ungulate numbers, thereby benefiting hunters and wolves.	Allotment permits issued by the U.S. Forest Service already incorporate the need to provide adequate forage for wild ungulates in addition to that for cattle. Decisions to manage grazing allotments, including closures, are made by the Forest Service, not WDFW, thus a recommendation of the type made in this comment is not included in the plan. Changes in the management of allotments go through a public review process under the National Environmental Policy Act (NEPA), which allows the public to recommend alternative forms of management, such as closures to benefit wolves.
One method to improve habitat for wolves and their prey is to include plans for permanent road closures. The wolf plan should reference work that is being considered or already being conducted by other agencies, such as Washington Department of Natural Resources and the U.S. Forest Service.	The recommended wolf plan does not propose closing forest roads to protect wolves. WDFW reviews and comments on draft forest plans prepared by other federal and state agencies, which may be reluctant to close forest roads if this results in significant reduction of recreational activities in popular areas. Forest road closures can benefit some ungulate populations, therefore WDFW game management plans often suggest collaboration between

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	WDFW and other state and federal agencies to consider closures of this type. The wolf plan states that ungulate populations will be managed through the implementation of WDFW's game management plans, thus the wolf plan does not discuss the more detailed management approaches for ungulates that are included in the game management plans.
Where the opportunity presents itself, WDFW should work with timber companies and other land management agencies to manage ungulate habitat to provide optimal interspersions of foraging habitat and hiding cover for ungulates. This could help reduce hunting success of wolves and reduce predation rates.	WDFW actively works with federal and state forest management agencies and private timber companies to provide habitat for ungulates, but this is more of a challenge with private companies, which manage their lands for profit. Even federal and state forest management agencies are somewhat limited in what they can accomplish for habitat improvement for ungulates because of requirements that they protect older growth forests.
More logging and prescribed burning is needed, not less, to increase browse production for ungulate populations. This may help offset increased predation rates by wolves.	This comment is correct that logging and prescribed burning helps deer and elk populations by increasing browse production. WDFW actively works with federal and state forest management agencies and private timber companies to provide habitat for ungulates, although agencies are somewhat limited in what they can accomplish because of emphasis in recent decades on protection of older growth forests.
Tribes will not accept reducing their ungulate harvests. State recreational hunters must reduce their harvest first. Current tribal harvests are below needs. All mortality factors must be managed concurrently.	Comment noted.
WDFW should reduce the number of hunting licenses sold while wolves are re-establishing themselves, so they will have enough prey.	WDFW has a dual mandate to preserve, protect, and perpetuate the native wildlife species of the state and to provide hunter opportunity by maintaining sustainable ungulate populations. As stated in the wolf plan, WDFW believes it can accomplish both objectives. Thus, WDFW does not believe that directly limiting deer and elk hunting is necessary to recover wolves. However, the wolf plan states that harvest objectives levels may need to be adjusted (probably mainly through changes in antlerless take) if overall predation levels on herds increase. Harvest objectives should be compatible with long-term sustainable populations of ungulates and predators.
WDFW should do more to reduce the tremendous impact cars have on deer populations in the Methow valley; this would provide more deer for hunters and wolves.	The Methow valley does experience a high level of collisions between deer and cars. WDFW works with the Washington State Department of Transportation to design highways to reduce ungulate-car collisions. However, in many situations, there are few practical solutions to the problem. Wildlife fencing is often impractical, expensive to build and maintain, and often inhibits the movement of wildlife to important habitats.
The plan needs greater emphasis on restoring ungulate populations as a prey base for wolves.	The recommended wolf plan calls for implementation of WDFW ungulate management plans, which should result in achieving healthy populations of deer, elk, and other species. The plan (Chapter 12, Task 5.2) lists three main methods for enhancing ungulate populations: improving habitat, management of recreational hunting, and reduction of poaching.
The plan needs to provide better information on how WDFW will maintain ungulate populations and hunter opportunity in the face of substantial wolf predation. The impact of wolf recovery on ungulate seasons and land access also needs to be	Implementation of WDFW game management plans for ungulates should result in achieving healthy population objectives for elk, deer, and other species. This goal would be accomplished primarily through habitat improvement, harvest management, and minimizing illegal hunting (see Chapter 12, Task 5, for more

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addressed.	detail). Harvest objectives (especially for antlerless take) may need to be adjusted if overall predation levels increase, and they should be compatible with long-term sustainable populations of predators and prey. Wolf recovery should not impose any additional limitations on land access for hunters.
The plan calls for increased enforcement to maintain ungulate numbers, yet these measures have generally been unsuccessful to date in realizing any meaningful improvements.	WDFW already prioritizes enforcement in areas known to experience higher rates of poaching. Presence of wolves will further drive enforcement priorities regarding poaching of ungulates.
The plan needs to include methods for protecting localized declining ungulate herds prior to delisting.	The recommended wolf plan now contains a provision stating that WDFW could consider reducing wolf abundance in localized areas occupied by at-risk ungulate populations before state delisting of wolves occurs if WDFW determined that wolf predation was a primary factor limiting the population and the wolf population in that wolf recovery region was healthy (i.e., it exceeds the delisting objectives for that recovery region). For the purposes of the recommended wolf plan, at-risk ungulate populations are defined as those that are federal or state listed, or any ungulate population for which it is determined to have declined 25% or more below management objectives for three or more years and population trend analysis predicts a continued decline. For populations for which numeric estimates and/or management objectives are not currently available, it will not be possible to use a specific threshold to assess a need for management action. Instead WDFW will use other sources of information related to the population, such as harvest trends, hunter effort trends, sex and age ratios, and others.
The plan must set better criteria (i.e., predator-prey ratios, cow-calf ratios, minimum elk numbers) for deciding when to intervene on declining ungulate populations and when to take appropriate wolf management responses. The plan is unclear on how much research is necessary to document adverse wolf impacts on ungulates before action is taken.	The recommended wolf plan now contains a provision stating that WDFW could consider reducing wolf abundance in localized areas occupied by at-risk ungulate populations before state delisting of wolves occurs if WDFW determined that wolf predation was a primary factor limiting the population and the wolf population in that wolf recovery region was healthy (i.e., it exceeds the delisting objectives for that recovery region). For the purposes of the recommended wolf plan, at-risk ungulate populations are defined as those that are federal or state listed, or any ungulate population for which it is determined to have declined 25% or more below management objectives for three or more years and population trend analysis predicts a continued decline. For populations for which numeric estimates and/or management objectives are not currently available, it will not be possible to use a specific threshold to assess a need for management action. Instead WDFW will use other sources of information related to the population, such as harvest trends, hunter effort trends, sex and age ratios, and others. The plan states that decisions of this type would be based on scientific principles and evaluated by WDFW.
WDFW should increase hunting of cougars, bears, and bobcats to control their numbers. This would help protect ungulate populations as wolves increase and would benefit wolves through reduced competition over food.	One of WDFW's management goals for black bears, cougars, and other predators is to preserve, protect, perpetuate, and manage these species and their habitats to ensure healthy, sustainable, and viable populations. Thus, WDFW would not reduce the numbers of some predator species in an effort to increase the abundance of others. As noted in Chapter 6 of the recommended wolf plan, ecological relationships within predator communities are complex, thus the type of management suggested in this comment could easily fail to produce the intended result (in this case, benefit

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	wolves).
Supplement elk populations in wolf recovery areas to increase elk populations. If unsuccessful, domestic livestock should be purchased to support the wolves.	The first suggestion is not a practical approach for managing multiple elk populations. The second suggestion is unrealistic and could lead to increased levels of wolf depredation on livestock in an area.
Support the use of ungulate monitoring in the wolf plan to ensure that deer and elk numbers remain within acceptable limits. The plan should explicitly state how these numbers will be assessed and WDFW should be held accountable to provide those numbers.	The level of detail requested in this comment is beyond the scope of the wolf plan, but additional information on ungulate monitoring can be found in other WDFW documents pertaining to deer, elk, and other big game management.
Support the draft plan's use of non-lethal hazing methods for wolves showing signs of habituation to humans before using lethal measures.	Comment noted.
The recommendation to expand existing efforts to maintain and restore habitat connectivity for wolves may be the single most expensive and publicly sensitive part of the plan.	WDFW believes that maintaining and restoring habitat connectivity is important in achieving recovery goals for wolves and other large carnivores. Chapter 12, Task 7, of the recommended wolf plan identifies actions needed to accomplish this. Few if any actions related to improving habitat connectivity would be done solely on behalf of wolves. They would also be conducted to assist in the conservation of other large carnivores (such as grizzly bears, wolverines, and lynx), ungulates, and other wildlife. Much of this work would be done through existing funding opportunities and therefore may not require large amounts of new funding. WDFW acknowledges that land purchases by the government can be controversial, but conservation easements and other types of agreements may be equally suitable methods for improving habitat connectivity without being as controversial. Acquisitions would only be done with willing landowners.
Public hunting of cougars should be reduced if wolves are shown to be adversely affecting cougar populations in the state.	If cougar numbers were shown to be declining in the state for any reason, WDFW would evaluate whether reductions in cougar hunting were needed. As described in Chapter 6, Section A, of the recommended plan, wolf recovery has not been shown to have widespread effects on cougar abundance in other western states or provinces. Thus, cougar abundance is not expected to decline greatly in Washington as wolf numbers expand.
Support a plan that allows WDFW to manage and control problem wolves immediately, if needed, to protect other listed species.	Chapter 12, Task 8, of the recommended plan describes the steps that would be taken to manage conflicts between wolves and other listed species. WDFW would work with partner agencies to resolve conflicts as quickly as possible. In many cases, in-depth field investigations or research may be needed to confirm that a listed species is indeed being adversely impacted by wolves and not by other factors. This could slow response times, but would ensure that the correct problem(s) are addressed when management actions are taken.
The plan should include greater discussion on management options for avoiding potential wolf impacts on listed species, such as woodland caribou. Management actions should be based on good science.	Chapter 12, Task 8, of the recommended wolf plan describes the steps that would be taken to manage conflicts between wolves and other listed species. WDFW would work with partner agencies to resolve conflicts as quickly as possible. In many cases, in-depth field investigations or research may be needed to confirm that a listed species is indeed being adversely impacted by wolves and not by other factors. This could slow response times, but would ensure that the correct problem(s) are addressed when management actions are taken. Some additional discussion has

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	been added to this task, but greater detail is difficult to provide in a plan of this type because of the many species and different circumstances that need consideration.
Education about wolves should also cover the benefits they provide to ecosystems. WDFW's wolf webpage should include more information on this topic.	WDFW has added material to Chapter 12, Task 9, of the recommended plan to include wolf-related benefits to ecosystems.
I believe wolf education that targets livestock producers, hunters, and backcountry hikers will be vital in promoting tolerance of wolves.	Several of the tasks (9.2, 9.3, 9.4, 9.5) in Chapter 12 of the wolf plan include actions to promote tolerance of wolves among these stakeholder groups.
WDFW should provide wolf educational materials to hunters at the time they buy licenses and to ranchers. These should explain that their fears are unfounded, that wolves will not decimate ungulate populations, and that wolves are intelligent family-oriented animals.	Under Chapter 12, Tasks 9.3 and 9.4, of the recommended plan, WDFW will develop and provide educational materials for livestock owners and hunters, both of which are considered key stakeholder groups in wolf conservation and management. These materials would be provided in various ways. A better method of reaching hunters might be through publication of wolf information in the hunting regulation pamphlet rather than by distribution of materials at the time of license purchase.
WDFW should host workshops that bring ranchers dealing with wolf-livestock conflicts in neighboring states to inform ranchers in Washington about successful practices.	WDFW would consider educational opportunities of this type. These could be part of the various training and educational programs for livestock owners mentioned in Chapter 12, Task 9.3, of the recommended plan.
I believe wolf education in rural areas will be vital in promoting tolerance of wolves.	Several of the tasks (9.2, 9.3, 9.4) in Chapter 12 of the recommended plan include actions that would mainly or partially target rural residents.
Hikers should be educated to not bring their dogs with them when hiking in areas inhabited by wolves.	Under Task 9.5.2 in Chapter 12 of the recommended plan, wolf information could be distributed to recreationists at trailheads and other appropriate outlets. This material would include information warning outdoor users about the potential for negative interactions between wolves and dogs in areas occupied by wolves. This could include a suggestion that dog owners leave their dogs at home when hiking in such areas. This suggestion is also given in Chapter 7, Section C.
WDFW should consider working with groups such as Wolf Haven International, the Wolf Education and Research Center, and Conservation Northwest, who are also committed to presenting balanced information campaigns about wolves.	WDFW would be willing to work with any partner group that would provide balanced educational information about wolves (see Chapter 12, Task 9.5.4, of the recommended plan).
Would like to see community-based conservation approaches used for recovering wolves. These will help resolve conflicts.	Community-based conservation approaches (where conservation and development are simultaneously achieved) may have applicability in wolf recovery in Washington. WDFW would be willing to work with partners to investigate the application of this approach in resolving wolf-human conflicts at the community level.
<b>Chapter 13 – Costs and funding priorities</b>	
It's important that WDFW coordinate with other agencies so there isn't competition for management dollars and redundancy in programs.	This comment is correct, as noted in Chapter 12, Task 10, of the recommended plan.
Washington State's current fiscal crisis should prevent any money being spent on wolf management. The state just can't afford it.	Washington's current fiscal problems will present challenges to funding certain portions of the recommended wolf plan. The availability of various federal funds and partnering with other state and federal agencies, organizations, and other entities will be important in addressing some aspects of the plan and in reducing

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	the financial burden on WDFW. As wolves continue to reestablish in Washington, it is unrealistic to believe that no public funding should be spent on their conservation and management, especially for monitoring and conflict management.
Oppose spending tax dollars on wolf recovery, including compensation.	As a top predator that is returning naturally to Washington, wolves have a much greater capacity to affect people, other wildlife, and ecosystems than most other species of wildlife. The many potential benefits and costs resulting from the reestablishment of wolves in the state require that considerable management effort (and associated spending) be devoted to this species. Partnering with non-governmental organizations will help reduce some of the taxpayer costs associated with implementing the actions called for in the recommended plan. However, it is unrealistic to believe that no public funding should be devoted to a species that has the potential to affect a number of stakeholder groups.
Increased funding for wolf recovery is extremely important and should be secured before implementation of the plan begins.	Long-term conservation and management projects, such as those described in the recommended plan, are ongoing and cannot be delayed while sufficient funding is accrued. Typically, funds for most WDFW activities are provided on an annual or biannual basis.
Wolf conservation and management costs will likely be larger than anticipated in the plan. The annual cost of the plan including compensation will be closer to \$750,000-\$1,000,000 per year. The estimates for livestock conflicts are too low and should be increased.	Chapter 13, Table 14, of the recommended plan already indicates that funding needs for wolf conservation and management could reach about \$400,000 by 2016. Costs beyond then become increasingly difficult to predict and will depend in part on how many wolves are present in Washington at that time. However, annual funding needs would likely continue to grow to higher levels. Expenditures for addressing wolf-livestock conflicts in Table 14 are expected to be relatively small over the next 6 years because of the state's small wolf population. Conflicts will likely increase over time as the population grows, but wolf numbers in Washington are expected to increase more slowly than in Idaho, Montana, and Wyoming because Washington lacks large blocks of high quality habitat for wolves.
The cost estimates provided in the plan are very general. Are other costs buried in other parts of the state budget for more staff, office space, vehicles, and other operating costs?	Many of the cost estimates given in Chapter 13, Table 14, of the recommended wolf plan, such as those for hiring a wolf specialist, include operating costs such as staff time, office space, office equipment, and vehicles. However, for existing staff participating in wolf-related work, some of these costs are already covered through other funding sources.
Concerned that staff losses at WDFW will mean fewer people available to conduct wolf management tasks.	Staff and budget reductions at WDFW affect many aspects of the agency's work. As with all of its activities, WDFW's work on wolves will need to be done with the resources available and prioritized by importance. The recommended wolf plan calls for hiring a wolf specialist who will conduct much of the field work on wolves for the agency. Because wolf conservation and management is a priority for WDFW, management of other nongame species could be reduced as work on wolves increases.
Concerned that more bureaucrats will be hired with state taxpayer dollars to manage wolves.	This likely will not happen because most wolf conservation and management activities need to be performed at the field level rather than the headquarters level.
Funding measures described in the plan do not consider the costs associated with lawsuits involving wolf recovery.	The estimated budget presented in Chapter 13 of the recommended wolf plan focuses only on the high priority conservation and management activities called for in the plan. Costs of lawsuits are an unknown factor for many of WDFW's

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If there are so few wolves in Washington, why not let them remain endangered rather than undertaking costly recovery measures? Is WDFW receiving some sort of outside funding (for example, Title VI "slush funds") in exchange for recovering wolves?	activities, including wolves, and are not possible to anticipate. WDFW attempts to actively manage state listed species with the goal of achieving recovery and eventual delisting. WDFW relies on a combination of federal and state endangered species grants to fund current wolf conservation and management efforts.
With limited resources available, where will WDFW get the funding to expand habitat improvements for ungulates and enforcement against poaching of ungulates, as called for in the wolf plan? These activities need a funding source.	Because of staff and budget reductions at WDFW, some desired activities such as expanded anti-poaching enforcement may be delayed or performed at a reduced level until improved funding becomes available. As noted in Chapter 13, WDFW will continue to seek additional funding for wolves from different sources. It will also work partner agencies and organizations to conduct some activities and to provide some funding.
Adequate funding for compensation is important. However, I am concerned that the Legislature will not fully fund the compensation portion of the plan, especially because of the state's current budget crisis.	WDFW considers adequate funding for depredation compensation to be very important. At this time, the Legislature may be unable to fund the compensation program proposed in the recommended wolf plan (see Chapter 4, Section G). However, compensation in Washington is currently available through special grants to WDFW from the U.S. Fish and Wildlife Service and Defenders of Wildlife. Until the wolf plan is approved, WDFW would likely pay only the full market value of confirmed wolf depredations and half the market value for probable wolf depredations rather than the higher rates recommended in the plan. Because of the small size of Washington's wolf population, only small amounts of funding for compensation is expected to be needed through at least 2015.
Livestock owners should receive financial assistance for purchasing and implementing non-lethal measures to prevent livestock losses. Making these measures available at little or no cost to ranchers is just as important as paying compensation for livestock losses and needs full funding.	Implementation of proactive non-lethal deterrents will impose additional financial costs on the livestock producers using them. Under Chapter 12, Task 4.3.4, of the recommended wolf plan, WDFW will seek funding to help producers implement these types of deterrents. However, widespread use of proactive measures would likely mean that total costs exceed available funding and that most producers will receive no or only partial reimbursement.
Who will pay for non-lethal control measures to protect livestock? Currently, WDFW has problems paying for crop damage due to elk. Protection of livestock from wolves will be much more expensive, and the funding sources for this should be outlined now.	Implementation of proactive non-lethal deterrents will impose additional financial costs on the livestock producers using them. Under Chapter 12, Task 4.3.4, of the recommended wolf plan, WDFW will seek funding to help producers implement these types of deterrents. However, widespread use of proactive measures would likely mean that total costs exceed available funding and that most producers will receive no or only partial reimbursement.
The plan should identify funding priorities among the many tasks associated with wolf conservation and management. This would allow limited funding to be directed toward activities of high priority.	High priority tasks associated with wolf conservation and management are shown in Chapter 13 and Table 14 of the recommended wolf plan.
Adequate funding is important for monitoring the wolf population as it recovers. This will provide several benefits, including ensuring prompt delisting.	WDFW agrees with this comment.
Wolf education programs should be a high priority and well funded.	Education and outreach are one of the most important components of wolf conservation and management (see Chapter 9 and Chapter 12, Task 9). In Chapter 13, outreach and education are considered a high priority activity and rank third in estimated spending over the next 6 years after monitoring and protection.

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Funding for translocation should be included as part of the plan.	Translocation is not considered a high priority activity over the next 6 years in Chapter 13, but could become an important priority beyond then if wolves are failing to reach one of the recovery regions designated in the plan, thereby delaying downlisting and delisting.
Research on wolves should be well funded.	WDFW does not list research as a high priority activity over the next 6 years in Chapter 13. Nevertheless, research (Chapter 12, Task 11) will be needed to support many of the activities called for in the recommended plan, including population modeling, determination of population viability, and impacts to game populations. Therefore, research needs to be well funded.
Because of Washington's current fiscal crisis, funding for research, training, and education should be deleted.	Research, training, and education are all important components of wolf conservation and management in Washington. Failure to fund these would leave major gaps in conservation and management efforts and would not be in the public's interest. For example, education and outreach directed toward livestock producers, rural residents, and outdoor users regarding methods for reducing conflicts with wolves (Chapter 12, Tasks 9.2 through 9.5, of the recommended wolf plan) can help reduce the overall costs of wolf management. Research (Chapter 12, Task 11) will be needed to support many of the activities called for in the plan, including population modeling, determination of population viability, and impacts to game populations.
Funding should be prioritized toward management and control rather than education and outreach.	WDFW considers education and outreach about wolves to be a high priority component of wolf conservation and management (Chapter 13). Chapter 12, Tasks 9.2 through 9.5, of the plan calls for education and outreach of livestock producers, rural residents, and outdoor users about methods for reducing conflicts with wolves. Education and outreach can therefore be important in reducing the overall costs of wolf management, including control work.
Suggest WDFW hire a wolf specialist to conduct general purpose wolf-related activities and reduce funding for remaining wolf-related activities by 75%.	Major funding restrictions of the type recommended in this comment would mean that many necessary aspects of wolf conservation and management would not be performed or performed only a limited basis. These activities could include resolving wolf-livestock and human safety conflicts, managing game populations affected by wolves, monitoring, enforcement against illegal killing, outreach and education, research, and collaboration with other entities to reduce costs for WDFW.
WDFW's resources should be devoted to game and other wildlife management needs, not to wolf recovery.	As a top predator that is returning naturally to Washington, wolves have a much greater capacity to affect people, other wildlife, and ecosystems than most other species of wildlife. The many potential benefits and costs to other wildlife populations resulting from the reestablishment of wolves in the state require that considerable management effort (and spending) be devoted to this species.
Wolves should not receive greater priority for spending than other listed wildlife.	As a top predator that is returning naturally to Washington, wolves have a much greater capacity to affect people, other wildlife, and ecosystems than almost any other species of listed wildlife. The many potential benefits and costs resulting from the reestablishment of wolves in the state require that considerable management effort (and spending) be devoted to this species.
Funding human needs in this state is far more important than paying to recover wolves.	As a top predator that is returning naturally to Washington, wolves have a much greater capacity to affect people, other wildlife, and

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	ecosystems than most other species of wildlife. The many potential benefits and costs to the public resulting from the reestablishment of wolves in the state require that considerable management effort (and spending) be devoted to this species.
Gaining legislative support for funding the plan needs to be a number one priority of WDFW.	WDFW will work with the Legislature to obtain funding support for various programs involving wolves, especially those providing compensation for livestock depredation and implementation of proactive deterrents.
Because of the state's current financial crisis and WDFW's shrinking budget, where are the funds going to come from for the many different aspects of wolf recovery and management? It is doubtful that there will be enough funding to adequately compensate livestock owners for economic losses due to wolf recovery.	Nearly all funding for wolf-related activities in Washington currently comes from federal endangered species recovery grants, shared costs with partner agencies and non-governmental organizations, research grants, and state nongame and endangered species funding. These sources are likely to continue at some level in the future. WDFW will continue to explore new funding opportunities to supplement these sources. In particular, WDFW will work with the Legislature to obtain funding support for compensation for livestock depredation and implementation of proactive deterrents.
Where will the money for wolf recovery come from after wolves destroy game populations and hunting revenue declines? There will be no money left to fund wolf management.	WDFW does not expect major declines in game populations and hunting revenue to occur because of the reestablishment of wolves in Washington (Chapter 14, Section C). Hunting license revenue funds only a tiny portion of the administrative costs devoted to wolf conservation and management in the state. Nearly all funding for wolf-related activities comes from federal endangered species recovery grants, shared costs with partner agencies and non-governmental organizations, research grants, and state nongame and endangered species funding. These sources are likely to continue at some level in the future, but will need to be supplemented by funds from other sources.
Oppose WDFW spending funds from the sales of hunting licenses on wolf recovery.	Nearly all funding for wolf-related activities in Washington currently comes from federal endangered species recovery grants, shared costs with partner agencies and non-governmental organizations, research grants, and state nongame and endangered species funding. Hunting license revenue currently funds only a tiny portion of the administrative costs devoted to wolf conservation and management in the state. Hunting license revenue is not expected to be used in the future except for managing some wolf-ungulate interactions.
Any revenue obtained from hunting wolves should be put into programs that benefit wolves and their prey, including habitat restoration.	The recommended wolf plan only describes the conservation and management activities needed for wolves until they become state delisted. The plan does not make a decision on whether wolves will be hunted by the public after state delisting occurs. Thus, it does not discuss how revenue from public wolf hunting would be spent, although it very likely would contribute to WDFW's game management activities. This could include habitat restoration projects for game.
Compensation programs should be paid by taxpayers, not hunters or livestock operators.	Compensation for wolf depredation of livestock has recently shifted from a conservation organization to a state-run program that has received initial funding grants from the U.S. Fish and Wildlife Service and Defenders of Wildlife. WDFW will work with U.S. Fish and Wildlife Service, the state legislature, and other entities to continue adequate funding for compensation in the future. Hunting revenue will not be used for this program. Livestock organizations may have a role to play in maintaining the

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	program, but it would not be through direct contributions by members.
Livestock operators should contribute to the costs of wolf recovery because they have long been subsidized by taxpayers.	Compensation for wolf depredation of livestock has recently shifted from a conservation organization to a state-run program that has received initial funding grants from the U.S. Fish and Wildlife Service and Defenders of Wildlife. WDFW will work with U.S. Fish and Wildlife Service, the state legislature, and other entities to continue adequate funding for compensation in the future. Livestock organizations may have a role to play in maintaining the program, but it would not be through direct contributions by members.
This chapter presents a wish list of spending on wolf-related activities and is vague on how funding for wolf management will be secured. This section could indicate whether State Wildlife Grants, Pittman Robertson funds, and other sources will be used.	Chapter 13 has been revised to show costs for implementing high priority activities. It also provides more information on funding sources. Currently, nearly all funding for wolf-related activities in Washington comes from federal endangered species recovery grants, shared costs with partner agencies and non-governmental organizations, research grants, and state nongame and endangered species funding. Hunting license revenue and Pittman Robertson grants currently fund only a tiny portion of the administrative costs devoted to wolf conservation and management in the state. Hunting license revenue and Pittman Robertson grants are not expected to be used in the future except for managing some wolf-ungulate interactions.
Once wolves are federally delisted, funding from the federal government will decline or disappear. Establishing a trust originating from a Congressional appropriation or private donations could build interest and help offset the future high costs of managing wolves in the state.	This suggestion is worthy of consideration.
WDFW should not be too reliant on federal funding to achieve wolf recovery because these sources of funds could suddenly shift. The state needs to be able to contribute significant amounts of its own funding on a long-term basis.	No funding sources are ever considered permanent. Thus, WDFW will continue to seek out new sources of funding in the future to maintain or expand wolf conservation and management activities.
To raise funds for livestock depredation, WDFW could consider a "wolf depredation" check-off on the filing of state income taxes or a wolf license plate.	These suggestions are worthy of consideration.
It is unfortunate that the most innovative funding source identified in the draft environmental impact analysis and plan is to create a new wolf license plate, especially since there is currently a moratorium on new background license plates in the state.	Additional suggestions for potential funding sources were added to Chapter 13. The moratorium on new background license plates was recently lifted.
The state general fund should be used to pay for monitoring the size of the wolf population.	Monitoring of the wolf population is already being funded by federal endangered species recovery grants, shared costs with partner agencies and non-governmental organizations, and state nongame and endangered species funding. These sources are likely to continue at some level in the future, but could perhaps be supplemented by additional sources such as the general fund. However, WDFW has received less funding from the general fund in recent years and this trend is expected to continue because of the state's current budget problems.
The U.S. Fish and Wildlife Service received large	Private funding will be important in many wolf conservation and

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amounts of money from special interest groups and support from big city folks to reintroduce wolves into Yellowstone and Idaho. These sources of revenue should be explored for wolf recovery funding in Washington as well.	management activities. WDFW will explore funding opportunities from all sources, including conservation organizations and other non-governmental entities.
Private funding of wolf recovery will be critical.	Private funding will be important in many wolf conservation and management activities. WDFW will explore funding opportunities from all sources, including conservation organizations and other non-governmental entities.
If lack of adequate funding for translocation is a concern, I am sure there are private conservation groups that could assist with funding for this activity.	Private funding will be important in many wolf conservation and management activities, including possibly translocation if this activity is initiated. In the case of translocation, WDFW would explore funding opportunities from multiple sources, including conservation organizations and other non-governmental entities. The recent fisher reintroduction onto the Olympic Peninsula was funded in part by conservation groups.
Funding for wolf management activities, including compensation, should come from pro-wolf groups and supporters rather than from the limited funds devoted to other wildlife management programs.	WDFW will explore funding opportunities from all sources, including conservation organizations, to help with wolf conservation and management (Chapter 12, Task 4.3.4). However, for other wolf management programs, it is unrealistic to expect conservation organizations to provide all funding. As a top predator that is returning naturally to Washington, wolves have a much greater capacity to affect people, other wildlife, and ecosystems than most other species of wildlife. It is therefore reasonable that some public funding should go towards managing wolves, which have the potential to affect so many segments of society.
Suggest that funding for proactive measures be obtained from a 0.5 of 1% wolf/endangered species sales tax.	This funding source is probably not worthy of consideration, given the current anti-tax mood of state residents. If these sentiments change in the future, then perhaps it could be considered.
There should be a tax on all private lands based on how much the current use has displaced the natural communities. A fee of \$5/acre for parcels which support little or none of the original native plant and animal communities, with reduced fees for large blocks of land that support at least some of the native community, could provide an annual revenue of about \$100 million dollars. This money could be used for acquisition of wildlife habitat, restoration of native communities, improve management of human activities, such as poaching, and studying the impacts of humans on wildlife.	Comment noted.
Support ways for the general public to contribute financially to wolf recovery.	One addition made to Chapter 13 was to list voluntary public contributions as a possible funding source.
I am willing to pay taxes or other fees to ensure there are programs to recover wolves in the state.	Comment noted.
<b>Chapter 14 – Economic analysis</b>	
The economic costs of wolf recovery are underestimated in the draft wolf plan.	As described in Chapter 14 of the recommended wolf plan, it is difficult to predict with certainty the total value of the costs and benefits that will be associated with wolf recovery in Washington. This is partly because of the difficulty in predicting the numbers and locations of wolves that will become reestablished in the state.

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	As noted in Chapter 14, Section B, some types of costs for livestock producers (such as physiological impacts to livestock, changes in grazing methods, additional ranch labor, and additional ranch supplies) could not be analyzed because of a lack of data to conduct analyses. Thus, costs for livestock owners living in or using areas occupied by wolves are perhaps underestimated. As noted in Chapter 14, Section B, a small wolf population (fewer than 100 animals) is expected to have few negative effects on big game hunting and related economic activity in the state, whereas a larger wolf population (200 or more animals) will likely produce greater impacts. Despite this, WDFW does not believe that the total costs of wolf recovery will be high. Wolf-related tourism has the potential to offset some overall costs (see Chapter 14, Section D).
Wolf recovery will be too much of a financial burden on local economies, taxpayers, livestock owners, and governments (through reduced tax revenues), and the state as a whole.	WDFW does not believe this statement will be true. As described in Chapter 14 of the recommended wolf plan, it is difficult to predict with certainty the total value of the costs and benefits that will be associated with wolf recovery in Washington. This is partly because of the difficulty in predicting the numbers and locations of wolves that will become reestablished in the state. As noted in Chapter 14, Section B, some types of costs for livestock producers (such as physiological impacts to livestock, changes in grazing methods, additional ranch labor, and additional ranch supplies) could not be analyzed because of a lack of data to conduct analyses. Thus, costs for livestock owners living in or using areas occupied by wolves are perhaps underestimated. As noted in Chapter 14, Section B, a small wolf population (fewer than 100 animals) is expected to have few negative effects on big game hunting and related economic activity in the state, whereas a larger wolf population (200 or more animals) will likely produce greater impacts. Despite this, WDFW does not believe that the total costs of wolf recovery will be high. Wolf-related tourism has the potential to offset some overall costs (see Chapter 14, Section D).
Wolves should not be considered more important than people trying to make a living.	WDFW acknowledges that some people will experience adverse effects as a result of wolf recovery in the state, but believes the number of people impacted will be relatively small. A major goal of the wolf plan is to reduce conflicts with wolves through various proposed management tools so that large numbers of people are not adversely affected by wolf recovery. These tools include the use of both non-lethal and lethal measures to minimize and prevent wolf-livestock and other conflicts, generous compensation for livestock depredations, methods to address wolf impacts to at-risk ungulate populations, and measures to prevent wolf-human interactions. Outreach and education programs will be used to inform the public on ways to avoid conflict situations with wolves.
The costs of wolf recovery are likely to be high and will likely exceed any financial benefits generated from tourism.	As described in Chapter 14 of the recommended wolf plan, it is difficult to predict with certainty the total value of the costs and benefits that will be associated with wolf recovery in Washington. This is partly because of the difficulty in predicting the numbers and locations of wolves that will become reestablished in the state. Nevertheless, based on the analyses presented in Chapter 14, WDFW does not believe that the total costs of wolf recovery will be high. However, total costs could indeed surpass the benefits generated by wolf-related tourism in Washington if this form of

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	tourism develops only to limited extent.
The economic benefits of wolf recovery mainly through increased tourism and healthier ungulate herds will likely exceed the costs of recovery.	As described in Chapter 14 of the recommended wolf plan, WDFW does not believe that the total costs of wolf recovery will be high in Washington. It is possible that the benefits mentioned in this comment could eventually surpass the costs resulting from conflicts. Overall, it is difficult to predict with certainty the total value of the costs and benefits that will be associated with wolf recovery in Washington. This is partly because of the difficulty in predicting the numbers and locations of wolves that will become reestablished in the state.
This chapter does a good job of identifying and addressing the potential problems associated with wolves but devotes only one paragraph to positive impacts. More information should be provided.	It is unclear whether this comment is referring to the potential positive economic impacts of wolves or to overall positive impacts, including ecological benefits. Currently, the recommended wolf plan discusses the potential positive economic impacts in Chapter 14, Section B (see page 182) and Section D, and the potential positive ecological impacts in Chapter 2, Section C.
Economic analyses need to be presented for each county that will likely be inhabited by wolves. The use of broader statewide data hides the adverse impacts that will occur in smaller areas.	The use of statewide data can mask potential adverse impacts (and benefits too) on smaller geographic units. However, pertinent data are generally not available for Washington's counties, especially for ungulate populations and hunting levels. This prevents conducting meaningful analyses of impacts at the county level. Additionally, the numbers and locations of wolves that will become reestablished in the state cannot be predicted at this time, which further precludes county-level analyses.
This chapter should be updated annually as data on wolf impacts come in from other states.	Although occasional updated economic analyses may be informative, WDFW does not believe that annual updates are necessary. The funding needed for such updates is better spent on actual on-the-ground wolf management.
Costs of wolf recovery are disproportionately placed on landowners. Those who want wolves don't have to pay the "costs."	The first sentence in this comment is true for livestock owners and a few other landowners living in areas occupied by wolves, but not for the vast majority of landowners in these areas or statewide. Regarding the second sentence, one of the major challenges of modern wildlife conservation in the U.S. is finding methods to expand financial support for conservation from a broader segment of the public, especially wildlife supporters.
Wolf presence will require changes in how ungulates and livestock are managed, but overall, this will have relatively little economic impact to the state as a whole.	As described in Chapter 14 of the recommended wolf plan, it is difficult to predict with certainty the total value of the costs and benefits that will be associated with wolf recovery in Washington. This is partly because of the difficulty in predicting the numbers and locations of wolves that will become reestablished in the state. Nevertheless, based on the analyses presented in Chapter 14, WDFW does not believe that the total costs of wolf recovery will be high.
This chapter should discuss the costs of protecting campers, kids, and pets from wolves.	No data exist on these aspects of wolf management in other states, thus analyses of these costs cannot be made for Washington. WDFW is not aware of significant resources being spent to protect campers, children, and pets from wolves in other states, thus the costs of such protection in Washington are likely to be small.
Economic assessment and much of the science used to manage wildlife populations here was conducted in a low wolf population environment, therefore costs may be substantially understated.	This statement is incorrect. Much of the information considered and used during the preparation of WDFW's recommended wolf plan comes from Idaho and adjoining parts of Montana and Wyoming, where moderate to high densities of wolves now exist. Because Washington does not have the large amounts of high quality wolf habitat found in these states, much of Washington

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	may never support a high density wolf population. This means that the economic costs associated with wolf recovery could be lower than some people fear.
What would the economic analysis look like for 500 wolves?	Because of the limited amount of high quality habitat for wolves in Washington, it seems unlikely that the state will ever reach a wolf population of 500 animals. Thus, economic analyses for this population size were not conducted in Chapter 14 of the recommended wolf plan.
Wolf restoration will have an adverse impact on ranchers and farmers, many of whom are already barely making it financially. Wolf-livestock conflicts will result in higher production costs for livestock operators. The livestock industry is important to the state's economy.	The livestock industry is an important component of Washington's economy. As discussed in Chapter 14, Section B, of the recommended plan, WDFW believes that a wolf population numbering 100 or fewer animals would pose little detriment to the state's livestock industry as a whole. At this population level, the vast majority of producers will probably experience few if any annual costs, whereas a few individual producers would be more affected. As the wolf population becomes larger and more widely distributed, financial impacts are likely to accrue to more producers. Nonetheless, most producers in the state will likely remain unaffected.
Wolves will ruin livestock operations. It is criminal to ruin anyone's business.	As discussed in Chapter 14, Section B, of the recommended plan, inquiries with state wolf managers in Idaho, Montana, and Wyoming did not indicate that ranchers in these states are being forced out of business due to wolf depredation and other wolf-related expenses. Thus, this problem is not expected to occur in Washington.
While wolf recovery will result in some livestock depredation, the amount will not be large enough to have any serious economic impact, and can be controlled in a responsible manner.	Wolf depredation on livestock will not cause serious economic harm to Washington's livestock industry, with populations of 50 and 100 wolves causing few depredations and affecting few livestock producers (see Chapter 14, Section B). Larger and more widely distributed wolf populations in the state will likely cause greater financial impacts and affect more producers. Given the generous compensation program for livestock depredation and the lethal and non-lethal control measures proposed in the plan, WDFW believes that wolf recovery can be accomplished without significant adverse costs to most livestock owners.
Wolf restoration will not have an adverse impact on the ranching industry because ranchers will be compensated for losses.	Wolf depredation on livestock will not cause serious economic harm to Washington's livestock industry, with populations of 50 and 100 wolves causing few depredations and affecting few livestock producers (see Chapter 14, Section B). Larger and more widely distributed wolf populations in the state will likely cause greater financial impacts and affect more producers. Given the generous compensation program for livestock depredation and the lethal and non-lethal control measures proposed in the plan, WDFW believes that wolf recovery can be accomplished without significant adverse costs to most livestock owners.
Do the livestock statistics presented in this chapter include beef cattle, feeder cattle, and dairy cattle? Some of these numbers do not look accurate.	The footnotes accompanying Tables 15 and 16 of the recommended plan have been updated to indicate more clearly that cattle numbers include beef, dairy, and other cattle. The category of "other cattle" includes heifers, steers, bulls 500 pounds and over, and all calves under 500 pounds. These figures include feeder cattle as well. The numbers presented in these tables were obtained from reports published by the National Agricultural Statistics Service.
There are very few large producing ranches left in	As discussed in Chapter 14, Section B, of the recommended plan,

Comment	Response
north-central Washington, thus wolf recovery will not have a big impact on the state's livestock industry.	WDFW does not believe that wolves will have a significant impact on Washington's livestock industry as a whole. However, some individual producers living in areas occupied by wolves will undoubtedly experience adverse financial impacts due to wolf recovery.
The statement that numbers of active grazing allotments on national forests have declined substantially is not completely accurate. In many parts of the state the number of permittees may have decreased but the number of AUMs (animal unit months) and acres has not decreased.	WDFW consulted with Bill Gaines of the U.S. Forest Service in Wenatchee, Washington, about this comment. He confirmed information previously given to WDFW that there has been a decline in active allotments, allotment acreage, and the number of AUMs over time on Forest Service allotments in Washington.
The numbers presented in Table 14 do not appear to be accurate compared to what actually is used, based on size of the national forest and the recollection of livestock producers having active permits.	The numbers previously presented in this table (now Table 17) were provided by the U.S. Forest Service, which administers their allotments, and therefore should be accurate. Additional grazing lease data from the Washington Department of Natural Resources, U.S. Bureau of Land Management, and WDFW have been added to the table to give a more complete picture of grazing allotments on public lands in Washington.
Will grazing allotments with wolves on national forests be rebid at a lower value due to anticipated livestock losses from wolves? If so, this could result in a decline in revenue to governments.	According to staff from the U.S. Forest Service, grazing allotments with wolves would not be rebid at a lower value due to anticipated livestock losses from wolves. Bid prices are set nationally and are non-negotiable, and therefore cannot be changed to reflect alterations in local conditions. Forest Service staff told WDFW that they would work with allotment holders to overcome potential wolf-related problems. This could include allowing changes in the locations and timing of where livestock are allowed to graze.
The plan does not consider the economic impacts of wolf depredation to small livestock producers in comparison to medium and large operators.	Small and extra small livestock producers comprise 87% of all livestock operations in Washington (see Table 16 of the recommended plan). As stated in Chapter 14, Section B, wolf-related losses could cause disproportionately greater financial hardship for small or extra small producers than for larger producers. However, a lack of sufficient background information on this topic prevented a more detailed analysis from being done in Section B.
This section states that there are possible non-lethal physiological impacts on ranch animals, including possible weight loss, stress, and lower birth rates in ranch animals resulting from the presence of wolves nearby. These are not "possible" impacts, but are documented real impacts that the livestock producer must bear.	WDFW stands by the language used about these concerns in Chapter 14, Section B, of the recommended plan. Inquiries with state wolf managers in Idaho, Montana, and Wyoming indicate that weight loss, stress, and lower birth rates among livestock exposed to wolves have not yet been confirmed under field conditions through scientific study. Recent studies by Laporte et al. (2010) and Muhly et al. (2010), which have been incorporated into Chapter 14, Section B, have shown that wolf presence can cause cattle to move more and avoid sites with high quality food. Although this implies higher energetic costs to the cattle affected, these concerns have not yet been proven to result in reduced weight gain or reproductive output. Until these problems are verified, the plan considers them as "possible" impacts.
The plan does not consider the problems caused by wolves on confined feeding operations or confined dairy operations where animal stress has a direct impact on production and profitability.	Feedlot cattle and dairy cattle kept in confined conditions or on relatively small pastures should be much less vulnerable to direct predation by wolves than beef cattle grazing on larger acreages. Feedlot cattle and dairy cattle could be vulnerable to stress from wolves occurring close by, which could potentially impact weight gain, milk production, and reproductive output. However,

Comment	Response
	research has not confirmed or measured these types of losses in other states, thus it was not possible to analyze these potential impacts for Washington in Chapter 14, Section B.
This section states that ranchers may need to move livestock more often or move them to alternative grazing sites to avoid wolf depredation. If livestock need to be moved more often, where do they get moved to?	As indicated in Chapter 14, Section B, ranchers wanting to avoid wolves could consider delaying livestock turnout in the spring or temporarily moving their livestock to other locations, such as elsewhere on their grazing allotment, to private pastures, or to fenced pastures. WDFW recognizes that such changes could be costly or may not be possible for some ranchers. Quantified information on these types of grazing changes by ranchers does not exist for Idaho, Montana, and Wyoming, thus an analysis of their economic impact to Washington livestock producers could not be included in this chapter.
The financial impact on a livestock operation having to hire additional personnel to keep track of animals over vast areas is prohibitive and is not discussed in the plan.	Chapter 14, Section B, of the recommended plan includes a subsection discussing the need to hire additional ranch labor in response to wolves. Some ranchers, especially those grazing larger acreages, may need to hire additional employees specifically to herd livestock in areas with wolves. Estimates of the extent and frequency of hiring additional labor for this purpose are not available for neighboring states. Therefore, an analysis of the type suggested in this comment could not be done to estimate this future cost for livestock producers in Washington.
This section states some ranchers may need to hire additional labor so they can increase supervision of ranch animals in areas with wolves, report depredation losses, and seek compensation. There may also be increased expenditures, including purchasing of replacement stock and proactive non-lethal control measures, such as herding and guarding dogs, fencing, fladry, and noise deterrents, as well as increased wear on vehicles and fuel use. Who pays for all of that?	Replacement of stock and guarding/herding dogs killed or injured by wolves would be paid through the compensation program proposed in the recommended plan (Chapter 4, Section F). As stated in Chapter 12, Task 4.3.4, WDFW will attempt to secure a funding source to assist ranchers in implementing proactive non-lethal deterrents. Some of this funding could go toward reimbursement of equipment costs for ranchers. Ultimately, however, many proactive measures and the hiring of additional ranch labor may have to be paid for by ranchers without reimbursement.
This section of the wolf plan does not consider that other necessary activities on a ranch will be neglected while the rancher is busy filing depredation claims with WDFW.	Chapter 14, Section B, of the recommended wolf plan mentions the time that ranchers could lose as they investigate potential depredation incidents and submit claims for compensation. This part of the plan provides a minimum value of the time spent on these activities, but acknowledges this is probably an underestimate for several reasons.
The economic impacts associated with this plan will force livestock owners to sell their lands to developers, which will be bad for wildlife conservation in the state.	As discussed in Chapter 14, Section B, inquiries with state wolf managers in Idaho, Montana, and Wyoming did not indicate that wolf depredation was forcing ranchers out of business in these states. Therefore, this concern seems unlikely to happen in Washington. WDFW agrees that the conversion of ranches and farms into residential and other types of developments is an important problem for wildlife conservation in Washington. However, given the above information, wolves are unlikely to cause increased conversion of ranchlands.
The value of grazing land is greatly reduced with the presence of wolves.	As noted in Chapter 14, Section B, inquiries with state wolf managers in Idaho, Montana, and Wyoming did not indicate that wolf depredation was reducing the value of grazing lands in these states. Therefore, this concern seems unlikely to happen in Washington.
This chapter claims that wolves may benefit some livestock operations by reducing the abundance of	As discussed in Chapter 6, Section A, and Chapter 14, Section B, of the recommended plan, wolves have reduced coyote numbers in

Comment	Response
coyotes and redistributing ungulates, thereby lowering coyote predation on livestock and ungulates. WDFW needs to present all documentation that supports this claim.	some locations (e.g., Yellowstone and Teton National Parks). Coyote reductions could therefore occur on other lands occupied by wolves, although as the recommended plan indicates, this has not yet been investigated or verified on ranchlands. If this was to occur, the plan states that any coyote reductions and accompanying benefits to ranchers would likely be localized and minor.
Ranchers and private landowners should be given tax incentives so they can modify their business practices to be more wolf compatible.	WDFW would support the creation of this type of tax incentive if it benefited wolf conservation, however, this would be up to individual counties to consider and implement.
Where are predator-friendly markets located and do they last during economic downturns?	Predator-friendly markets remain quite small and are spread across the country. WDFW does not have any information on their resiliency during economic downturns.
This chapter should discuss how ranchers feel about losing their livestock to wolves.	WDFW acknowledges that wolf predation on livestock also carries an emotional cost for many ranchers. However, Chapter 14 of the recommended plan attempts to assess only economic impacts. Non-tangible arguments are not presented for either side of the wolf recovery issue.
Wolf recovery will result in more food production being shifted to Latin America.	WDFW does not believe that this will occur. As discussed in Chapter 14, Section B, of the recommended plan, most livestock producers in Washington will experience few if any significant financial impacts related to wolf recovery.
Hunters have contributed in many ways to help finance wildlife and habitat conservation over the years. Wolf recovery risks alienating the hunting community to the point that hunting revenue will decline with associated losses to conservation.	WDFW certainly acknowledges the many contributions that hunters have made to wildlife and habitat conservation in Washington. The presence of wolves in the state could cause some hunters to stop hunting, but the extent of this will depend on the effects that wolves eventually may have on deer and elk populations through predation and changes in behavior.
A better evaluation of lost hunting opportunity and harvest opportunity resulting from wolf recovery should be incorporated into this chapter. For example, has WDFW calculated how many fewer hunters will harvest elk as wolf recovery proceeds?	Table 13 gives estimates of the numbers of deer and elk that may be killed annually by different population sizes of wolves in Washington. However, calculations of "lost" hunting opportunity and harvest opportunity associated with these estimates were not made because there are no hard data to base them on, thus they would be too speculative.
This chapter should state whether wolf recovery will result in reduced hunter opportunity for bighorn sheep and mountain goats.	Chapter 14, Section C, states that wolf take of bighorn sheep and mountain goats is expected to be minor, thus little or no reduction of hunting opportunity for these species is expected.
I disagree with the information presented indicating that wolves have had little effect on hunter harvest in neighboring states.	In spring 2011, during preparation of the recommended plan, WDFW updated the information appearing in Chapter 14, Section C, regarding wolf impacts on hunter harvest in neighboring states. This work included contacting wolf and game managers in Idaho and Montana and review of recent publications from these states and Wyoming. Wolves have contributed to reduced hunting opportunity in a few areas, but appear to have had little impact overall on hunter opportunity or license revenue at the statewide level in these states.
We need to ensure healthy ungulate populations because hunting is a big economic generator in our state.	One of the goals of the recommended plan is to manage ungulate populations in the state to provide adequate prey for wolves and to maintain harvest opportunities for hunters (see Chapter 5 and Chapter 12, Task 5).
Wolf restoration will have an adverse impact on big-game hunting opportunity, license sales, and associated spending by hunters. The decline in license and tag sales will strongly hurt WDFW's	WDFW believes that wolf recovery will have less of an effect on big game harvest and hunting opportunity in Washington than this comment suggests. Chapter 5, Section E, of the recommended plan indicates that a relatively small wolf population of fewer than

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own budget. Furthermore, there will be a drastic decline in big-game hunting in Washington, which will adversely affect local economies.	<p>100 animals will probably produce few negative effects on big game hunting in the state. Larger wolf populations will likely have greater impacts on big game hunting and hunting opportunity although these are difficult to predict for a number of reasons (Chapter 14, Section C).</p> <p>In spring 2011, during preparation of the recommended plan, WDFW updated the information appearing in Chapter 14, Section C, regarding wolf impacts on hunter harvest in neighboring states. This work included contacting wolf and game managers in Idaho and Montana and review of recent publications from these states and Wyoming. Wolves have contributed to reduced hunting opportunity in a few areas, but appear to have had little impact overall on hunter opportunity or license revenue at the statewide level in these states.</p>
Wolf restoration will not have a substantial adverse impact on big-game hunting opportunity, license sales, and associated spending by hunters.	<p>Chapter 5, Section E, of the recommended plan indicates that a relatively small wolf population of fewer than 100 animals will probably produce few negative effects on big game hunting in the state. Larger wolf populations will likely have greater impacts on big game hunting and hunting opportunity although these are difficult to predict for a number of reasons (Chapter 14, Section C).</p> <p>In spring 2011, during preparation of the recommended plan, WDFW updated the information appearing in Chapter 14, Section C, regarding wolf impacts on hunter harvest in neighboring states. This work included contacting wolf and game managers in Idaho and Montana and review of recent publications from these states and Wyoming. Wolves have contributed to reduced hunting opportunity in a few areas, but appear to have had little impact overall on hunter opportunity or license revenue at the statewide level in these states.</p>
The value of game species should be set at their raffle values. Thus, each moose should be worth \$30,000 and each bull elk \$6,000.	The recommended plan does not place a dollar value on any game animal or on a wolf. In addition, WDFW does not consider raffle values to be a good measure of the economic value of individual ungulates of each species.
The plan needs to estimate the number of deer and elk killed by wolves annually in the state, including prey that wolves kill for fun and do not eat.	Projected numbers of deer and elk killed by different population sizes of wolves are provided in Table 13 of the recommended plan. Wolves do not kill prey "for fun" and very rarely perform surplus killing (in which some prey are not eaten) of wild prey, thus these factors were not considered in the preparation of Table 13.
How were the numbers in Table 17 derived?	The numbers presented in this table (now Table 21 of the recommended plan) were derived primarily through telephone interviews with an adult member of 85,000 households nationwide to determine hunting, fishing, and wildlife watching patterns. Information for Washington was extracted from this large pool of respondents. Readers seeking more information on the procedures of this study should refer to the report cited in the table (i.e., US Fish and Wildlife Service and US Census Bureau 2008).
Impacts to big game hunting due to wolf recovery need to be managed in a way that does not incur a financial loss to the state.	One of the goals of the recommended plan is to manage ungulate populations in the state to provide adequate prey for wolves and to maintain harvest opportunities for hunters (see Chapter 5 and Chapter 12, Task 5). WDFW will attempt to manage both wolves

Comment	Response
	and ungulates in a sustainable way, which should cause little significant financial loss to state and local economies.
WDFW needs to contact hunting guides in Idaho to get accurate information on the impacts to guided hunting.	As stated in Chapter 14, Section C, Washington's outfitter industry is considerably smaller than in some neighboring states such as Montana and Idaho, but quantified information on the size and economic contributions of outfitting in Washington is lacking. Based on information obtained from the Washington Outfitters and Guides Association, many outfitters in the state offer multiple activities for clients during the year, with guided hunting being of lower importance as a source of income for most outfitters.
Hunter numbers and hunting opportunity in Washington have been declining over time. Wolves will make the problem worse. Hunters bring in lots of revenue and help the state's economy. I worry that wolf-caused declines to ungulate populations will cause more hunters to quit hunting or find hunting opportunities out of state.	Information presented in Chapter 14, Figures 19-21, indicates that deer and elk hunter numbers, number of elk hunter days, numbers of deer and elk harvested, and deer and elk hunter success have remained relatively steady in recent years. Only the number of deer hunter days has declined. Hunting brings in considerable revenue and contributes to many local economies and the state economy (see Table 21). Chapter 14, Section C, of the recommended plan indicates that a relatively small wolf population of fewer than 100 animals will likely have few negative effects on big game hunting in the state. Larger wolf populations will likely result in greater impacts to big game hunting and hunting opportunity.
Wolves can have significant adverse impacts on local ungulate populations. This is a particularly important consideration for tribal families who rely on subsistence harvest of game.	Any significant localized declines in deer and elk numbers could negatively affect those tribal families who rely on subsistence harvest of game.
Game populations provide far greater values to citizens of the state in the form of food, hunting opportunity, and in turn economic benefits to rural areas, whereas wolves offer none or few of these benefits.	The data presented Chapter 14, Sections C and D, support this comment. However, WDFW believes that wolves will not have a large impact on big game harvest and hunting opportunity in Washington and that big game hunting will continue to generate substantial economic benefits for state and local economies after wolves recover. Furthermore, wolf-related tourism has the potential to develop in Washington (see Section D) and generate modest economic benefits in some localities.
Public hunting of wolves will provide WDFW with an additional revenue source.	This will likely be true if public hunting of wolves is ever adopted in Washington. Chapter 14, Section C, provides a preliminary estimate of the revenue that might be generated for WDFW from wolf hunting in Washington. Based on information from Idaho and Montana, where wolf hunting license sales in 2009/2010 generated about \$450,000 and \$326,000, respectively, the estimated revenue that WDFW could earn from wolf hunting was increased in this section of the recommended plan over the amount that appeared in the public review draft.
Wolf recovery has the potential to bring tourism dollars to Washington.	This statement is true, as described in Chapter 14, Section D, of the recommended plan. However, whether significant wolf-related tourism ever occurs or not in Washington will depend on the numbers and locations of wolves that eventually become reestablished in the state and other factors.
Wolf-related tourism should not be intrusive to wolves.	WDFW agrees with this comment. This is one reason why WDFW does not provide the locations of wolf dens to the public (see Chapter 12, Task 2.3). Except at Yellowstone National Park, where large numbers of tourists go to see wolves, WDFW is not aware of any significant disturbance of wolves caused by tourist activities in other states.

Comment	Response
Presence of wolves will enhance the experience for many backcountry users in Washington.	This opinion is supported in part by the results of one of the survey questions summarized in Chapter 2, Section E, of the recommended plan, which indicate that 54% of Washington residents would travel to see or hear wild wolves in the state.
I support local economies by my participation in wildlife viewing. For example, I've already visited the Twisp area in hopes of hearing the Lookout Pack.	Comment noted.
My family is already boycotting Montana, Idaho and Oregon because they shoot wolves. We no longer spend our vacation dollars in these states.	Comment noted.
Wildlife tourism is fine, but it shouldn't be the only approach to maintaining and funding local and state economies.	Comment noted.
Washington does not have the viewing opportunities for observing wolves that places like Yellowstone National Park offers. Therefore, Washington will benefit minimally from wolf-related tourism. Furthermore, tourism related to viewing of deer, elk, and other wildlife will decline. Presence of wolves may also frighten some people away from visiting the state's wild areas.	As described in Chapter 14, Section D, of the recommended plan, WDFW believes that Washington has the potential to develop modest wolf-related tourism, but whether or not this ever occurs will depend on the numbers and locations of wolves that eventually become reestablished in the state and other factors. Mt. St. Helens and the Methow Valley are two locations that could possibly support wolf-related tourism. Regarding the last two sentences of this comment, the last paragraph of Chapter 14, Section D, indicates that disturbance by wolves could reduce tourism associated with the viewing of deer, elk, and other wildlife in some locations. Wolves could also frighten some people away from visiting the state's wild areas. Again, the extent to which these problems occur in the future will depend on the numbers and locations of wolves that eventually become reestablished in the state and other factors.
I disagree that overall wildlife tourism produces greater economic benefits than hunting and livestock production.	Chapter 14, Section D, of the recommended wolf plan states that "wolf tourism has the potential to offset or exceed the combined costs of livestock depredation and reduced hunting opportunities" in Washington, but does not make any broader statements such as the type given in this comment. However, as indicated in Chapter 14, Tables 21 and 22, data collected by the U.S. Fish and Wildlife Service indicate that wildlife tourism easily surpasses hunting in Washington in terms of total money spent by participants.
The plan should compare the amount of revenue WDFW received last year from watchable wildlife with the amount of revenue it received from ungulate tag sales, and hunting licenses.	This information is provided in Chapter 14, Sections C and D, of the recommended plan for the year 2007.
Who conducted the studies related to wildlife tourism and are they unbiased?	As noted in Chapter 14, Section D, the U.S. Fish and Wildlife Service and U.S. Census Bureau conducted the studies on wildlife tourism. Their results should therefore be relatively free of bias. Readers should refer to the cited studies to learn more about the potential limitations of this work.



State of Washington  
**Department of Fish and Wildlife**

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Main Office Location: Natural Resources Building, 1111 Washington Street SE, Olympia WA

July 28, 2011

Dear Interested Parties:

The Washington Department of Fish and Wildlife (WDFW) has published a Final Environmental Impact Statement (FEIS) titled: Final Environmental Impact Statement (EIS) for the Wolf Conservation and Management Plan for Washington. The plan has been developed to guide recovery and management of gray wolves as they naturally disperse into the state and reestablish a breeding population.

The Recommended Wolf Conservation and Management Plan will be provided to the Washington Fish and Wildlife Commission for consideration at their August 4, 2011 meeting in Olympia, Washington.

The Agenda for that meeting is found on the following link:

[http://wdfw.wa.gov/commission/meetings/2011/08/agenda\\_aug0411.html](http://wdfw.wa.gov/commission/meetings/2011/08/agenda_aug0411.html).

The Commission has scheduled three more special meetings to discuss the recommended Wolf Conservation and Management Plan and take public comment. Those meetings are tentatively scheduled for Aug. 29 in Ellensburg, and Oct. 6 and Nov. 3 in Olympia. Final action on the plan is expected to occur at the December 2011 Commission meeting.

The Draft EIS underwent public review from October 5, 2009 to January 8, 2010. Nearly 65,000 people provided comments on the plan. With consideration of all comments received, WDFW has prepared this Final Environmental Impact Statement in compliance with the State Environmental Policy Act (SEPA) and other relevant state laws and regulations.

## **MAJOR CONCLUSIONS**

This is a phased non-project review proposal. Phased review allows agencies and the public to focus on issues that are ready for decision and excludes from consideration issues that are already decided or are not yet ready.

The wolf is listed as an endangered species by the State of Washington, and the Wolf Conservation and Management Plan serves as the state recovery plan for the species. The goals of the plan are to: (1) restore the wolf population in Washington to a self-sustaining size and geographic distribution that will result in wolves having a high probability of persisting in the state through the foreseeable future, (2) manage wolf-livestock conflicts in a way that minimizes livestock losses, while at the same time not negatively impacting the recovery or long-term perpetuation of a sustainable wolf population, (3)

maintain healthy and robust ungulate populations in the state that provide abundant prey for wolves and other predators as well as ample harvest opportunities for hunters, and (4) develop public understanding of the conservation and management needs of wolves in Washington, thereby promoting the public's coexistence with the species.

## **AREAS OF CONTROVERSY AND UNCERTAINTY**

*Recovery Objectives* – the plan establishes recovery objectives to achieve a self-sustaining population, distributed throughout a significant portion of the historic range in the state, per WAC 232-12-297 (Endangered, threatened, and sensitive wildlife species classification). Fifteen breeding pairs, which represent an estimated 97-361 wolves, are considered minimal to achieve recovery. Several components of the delisting objectives serve to reduce the risk to long-term viability of a wolf population in Washington, including: the geographic distribution requirements across three recovery regions, the use of successful breeding pairs as a measurement standard, and a three-year requirement for maintaining population robustness on the landscape. The WDFW also conducted a modeling analysis of the delisting objective to test persistence on the landscape. Results indicated that the population would persist, as long as it was allowed to grow and was not limited at that number.

*Wolf-livestock conflict management* – addressing and reducing wolf-livestock conflicts is an important part of the plan. The plan includes both proactive, non-lethal (e.g., modified husbandry methods and non-lethal deterrents) and lethal management options to address wolf-livestock conflicts. The plan emphasizes prompt response to reported depredations and includes a program to compensate livestock producers for livestock killed or injured by wolves.

*Wolf-ungulate conflict management* – ungulates are the natural prey of wolves. The plan includes management options to address localized impacts to ungulate populations, if they occur. If WDFW determines that wolf predation is a primary limiting factor for an “at-risk” ungulate population, and the wolf population in that wolf recovery region is healthy, WDFW may consider reducing wolf abundance in the localized area occupied by the ungulate population. Management options would include both non-lethal and lethal measures; with non-lethal options prioritized while the species is listed.

WDFW believes this FEIS will assist decision makers to identify the key environmental issues and options associated with this action. Comments received from agencies and interested parties during public review of the draft document have been considered and incorporated into this final EIS. WDFW thanks all of those who comments and input into this process.

Sincerely,



Bob Zeigler  
SEPA/NEPA Coordinator  
Agency Responsible Official  
Protection Division  
Habitat Program

## Fact Sheet

**Title:** Final Environmental Impact Statement (EIS) for the Wolf Conservation and Management Plan for Washington

**Description:** This is a non-project review proposal. Wolves were classified as endangered in Washington under federal law in 1973 and under state law in 1980. They were federally delisted in the eastern third of Washington in 2011; and remain federally listed in the western two-thirds of the state, and state listed throughout Washington. As of July 2011, Washington had five confirmed wolf packs. Continued population growth in Washington is expected as a result of dispersal of wolves from existing packs and from wolf populations in Idaho, Montana, Oregon, and British Columbia.

The Washington Department of Fish and Wildlife (WDFW) initiated development of a state wolf conservation and management plan in 2007 in response to: increasing wolf dispersal and pack establishment in the state; requirements under WAC 232-12-297 to develop recovery plans for listed species; and the anticipated eventual return of all wolf management to the state. A determination of significance and request for comments on the scope of an environmental impact statement (EIS) was issued August 1, 2007 and seven public scoping meetings were held around the state. Also in 2007, WDFW appointed an advisory Wolf Working Group comprised of 17 citizens to provide recommendations on the plan to the Department. The Draft EIS/Wolf Conservation and Management Plan for Washington was completed in 2009.

Following the requirements of the State Environmental Policy Act (SEPA), the Draft EIS was made available for public review on October 5, 2009 for a 95-day public comment period. During the review period, WDFW held 12 public meetings across the state in October and November 2009. These meetings were attended by 1,157 people with 229 people providing comments on the plan. Nearly 65,000 people provided email and written comments on the Draft EIS. A blind peer review was also conducted during that time and WDFW received comments from 3 scientific peer reviewers. WDFW addressed the public input and met with the Working Group in June 2011 for review and comment on the proposed changes, and then produced the Final EIS/Recommended Plan. Responses to the comments received are included in the Final EIS.

The Final EIS incorporates recommendations and suggestions from public comments, peer review comments, WDFW reviews and the Wolf Working Group recommendations. The Preferred Alternative Final Recommended Wolf Conservation and Management Plan was developed as a result of the alternatives studied. The plan will serve as the state recovery plan for the wolf in Washington. As such, it establishes recovery objectives for downlisting and delisting the wolf in the state, per WAC 232-12-297, and identifies strategies to address conflicts and achieve recovery.

A decision on adoption of the Wolf Conservation and Management Plan by the Washington Fish and Wildlife Commission is expected at the December 2011 meeting. Prior to that, the Commission will hold workshops and discussions on the plan in August, October, and November 2011.

**Location:** Statewide

**Proponent and Lead Agency:**

Washington Department of Fish and Wildlife (WDFW)  
Wildlife Management Program  
600 Capitol Way North  
Olympia, WA 98501-1091

EIS Project Manager: Harriet Allen  
Phone: (360) 902-2694

**WDFW Responsible Official:**

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**Permits and Licenses Required:** None required

**Authors and Principle Contributors:** WDFW : Gary Wiles, Harriet Allen, Gerald Hayes, John Pierce, Rocky Beach, Dave Ware, Jerry Nelson, Donny Martorello, Nathan Pamplin, Madonna Luers, Steve Pozzanghera, Dave Brittell, Jeff Lewis; Washington State University: Ben Maletzke, Rob Wielgus.

**Wolf Working Group:**

In 2007, former WDFW Director Koenings appointed a group of 17 citizens to provide recommendations to the Department to assist in development of the plan. The names and affiliations of members are shown in Appendix B of this document.

**Date Draft Environmental Impact Statement (DEIS) was issued:** October 5, 2009.  
Comments were taken through January 8, 2010.

**Date Final Environmental Impact Statement (FEIS) is issued:** July 28, 2011

**Public meetings on the Draft EIS :** Public meetings were held during October – November 2009 at the following locations: Clarkston, Richland, Yakima, Colville, Spokane, Vancouver, Aberdeen, Seattle, Mount Vernon, Sequim, Omak, and Wenatchee, Washington.

**Date Final Action is Planned:** The Final EIS/Recommended Wolf Conservation and Management Plan for Washington will be presented to the Washington Fish and Wildlife Commission on August 4, 2011. Commission review will occur during August-November, and decision-making will occur at the December 2011 meeting.

**Date of Next Action and Subsequent Environmental Reviews:** The Final Environmental Impact Statement (FEIS) is a phased non-project action. The Recommended Wolf Conservation and Management Plan will be provided to the Washington Fish and Wildlife Commission for consideration on August 4, 2011 at their meeting in Olympia, Washington. The Agenda for that meeting is found on the following link:

[http://wdfw.wa.gov/commission/meetings/2011/08/agenda\\_aug0411.html](http://wdfw.wa.gov/commission/meetings/2011/08/agenda_aug0411.html)

**Notice of Availability:** The Final EIS is available for download on WDFW's website at:

[http://wdfw.wa.gov/licensing/sepa/sepa\\_final\\_docs\\_2011.html](http://wdfw.wa.gov/licensing/sepa/sepa_final_docs_2011.html) .

The complete public comments on the Draft EIS can be viewed at:

[http://wdfw.wa.gov/conservation/gray\\_wolf/comments.html](http://wdfw.wa.gov/conservation/gray_wolf/comments.html)

**Distribution List:** Notice of the availability of this FEIS is posted on the WDFW SEPA website at: [http://wdfw.wa.gov/licensing/sepa/sepa\\_final\\_docs\\_2011.html](http://wdfw.wa.gov/licensing/sepa/sepa_final_docs_2011.html) . Copies have been sent to local government planning departments (city and county); affected Tribes; all state and federal agencies with jurisdiction and interested parties.

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6 FINAL RECOMMENDED  
7 WOLF CONSERVATION AND MANAGEMENT  
8 PLAN FOR WASHINGTON  
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In 1990, the Washington Wildlife Commission adopted procedures for listing and delisting species as endangered, threatened, or sensitive and for writing recovery and management plans for listed species (WAC 232-12-297, Appendix A). The procedures, developed by a group of citizens, interest groups, and state and federal agencies, require preparation of recovery plans for species listed as threatened or endangered. This Final EIS/Recommended Wolf Conservation and Management Plan summarizes the historical and current distribution and abundance of wolves in Washington and describes factors that affect wolf recovery. It provides recovery goals for downlisting and delisting the species and prescribes strategies to achieve these goals, including management of conflicts with livestock and ungulates. As such, it serves as the recovery plan for wolves in Washington, per WAC 232-12-297.

A Draft EIS/Wolf Conservation and Management Plan for Washington was developed by the Washington Department of Fish and Wildlife (WDFW) during 2007-2009 and the Final EIS/Recommended Plan was completed in 2011 following public review. WDFW received extensive input from the advisory Wolf Working Group, which was comprised of 17 citizens from a broad range of perspectives and values. The group met eight times over a 15-month period in 2007 and 2008 to develop recommendations to the Department on a plan that would achieve wolf conservation and management. Following peer review by 43 reviewers, WDFW addressed their comments and met again with the Wolf Working Group in 2009 to review the changes. The Working Group provided additional comments on the revised draft, which were then incorporated in the Public Review Draft EIS/Plan. This document underwent a 95-day public review and blind peer review by 3 anonymous reviewers. Nearly 65,000 people provided comments on the Draft EIS/Plan. Comments are posted at: [http://wdfw.wa.gov/conservation/gray\\_wolf/comments.html](http://wdfw.wa.gov/conservation/gray_wolf/comments.html). Blind peer review comments are posted at: [http://wdfw.wa.gov/conservation/gray\\_wolf/](http://wdfw.wa.gov/conservation/gray_wolf/). WDFW addressed the public input and met with the Working Group in June 2011 for review and comment on the proposed changes, and then produced the Final EIS/Recommended Plan.

For additional information about wolf recovery or other state listed species, see:  
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## EXECUTIVE SUMMARY

The Wolf Conservation and Management Plan for Washington has been developed to guide recovery and management of gray wolves as they naturally disperse into the state and reestablish a breeding population. No wolves have ever been or will be reintroduced into Washington from areas outside the state as part of this plan. This is a state plan. There is no requirement for federal approval of the plan because the U.S. Fish and Wildlife Service (USFWS) has not established federal recovery criteria for wolves in Washington. When approved, the state wolf plan will apply statewide. However, implementation of some measures addressing conflicts (specifically, lethal control) will have to be consistent with federal law in those areas where wolves remain federally listed.

Wolves were classified as endangered in Washington under federal law in 1973 and under state law in 1980. Currently, wolves in the western two-thirds of Washington are listed as endangered under federal law; in the eastern third of the state they have been removed from federal listing. They are listed as endangered under state law throughout Washington. The USFWS is the lead management authority over wolves where they remain federally listed in the state and the Washington Department of Fish and Wildlife (WDFW) is the lead where wolves are federally delisted.

Gray wolves were formerly common throughout most of Washington, but they declined rapidly between 1850 and 1900. The primary cause of this decline was the killing of wolves by Euro-American settlers as ranching and farming activities expanded. Wolves were essentially eliminated as a breeding species from the state by the 1930s. The first fully documented breeding pack was confirmed in 2008. As of July 2011, there were five confirmed packs in the state: two in Pend Oreille County; one in Pend Oreille/Stevens counties; one in Kittitas County; and one in Okanogan/Chelan counties. Only one of these, in Pend Oreille County, was a successful breeding pair in 2010. There were also indications of single additional packs in the Blue Mountains and North Cascades National Park; and at least a few solitary wolves also likely occur in other scattered locations of Washington.

Human-related mortality, particularly illegal killing and legal control actions to resolve conflicts, is the largest source of mortality for the species in the northwestern United States and illegal killing has already been documented in Washington.

Wolves are dispersing into Washington from populations in adjacent states and provinces (Idaho, Montana, Oregon, and British Columbia) and some are forming resident breeding packs. In response to this, the need for a state recovery plan per WAC 232-12-297, and in anticipation of the eventual return of all wolf management to the state, the WDFW initiated development of a Draft Environmental Impact Statement (EIS) for a state wolf conservation and management plan under the State Environmental Policy Act (SEPA) in 2007. At that time, the former WDFW Director appointed an advisory Wolf Working Group comprised of 17 citizens to provide recommendations on the plan to the agency. Its members represented a broad range of perspectives and values with regard to wolf conservation and management and were representative of the geographic scope of Washington. Public scoping meetings were held around the state and multiple levels of reviews were conducted. Discussions among members of the Wolf Working Group helped frame issues for the plan. Recommendations and suggestions from the public scoping, the Wolf Working Group,

scientific peer review, public review, and WDFW reviews have been incorporated into the final recommended plan.

The purpose of the plan is to ensure the reestablishment of a self-sustaining population of gray wolves in Washington and to encourage social tolerance for the species by addressing and reducing conflicts. Goals of the plan are to:

- Restore the wolf population in Washington to a self-sustaining size and geographic distribution that will result in wolves having a high probability of persisting in the state through the foreseeable future (>50-100 years).
- Manage wolf-livestock conflicts in a way that minimizes livestock losses, while at the same time not negatively impacting the recovery or long-term perpetuation of a sustainable wolf population.
- Maintain healthy and robust ungulate populations in the state that provide abundant prey for wolves and other predators as well as ample harvest opportunities for hunters.
- Develop public understanding of the conservation and management needs of wolves in Washington, thereby promoting the public's coexistence with the species.

Three recovery regions were delineated for the state: (1) Eastern Washington, (2) Northern Cascades, and (3) Southern Cascades and Northwest Coast. Target numbers and distribution for downlisting and delisting within the three recovery regions are:

- To reclassify from state endangered to state threatened status: 6 successful breeding pairs present for 3 consecutive years, with 2 successful breeding pairs in each of the three recovery regions.
- To reclassify from state threatened to state sensitive status: 12 successful breeding pairs present for 3 consecutive years, with 4 successful breeding pairs in the Eastern Washington recovery region, 3 in the Northern Cascades recovery region, and 5 in the Southern Cascades and Northwest Coast recovery region.
- To delist from state sensitive status: 15 successful breeding pairs present for 3 consecutive years, with 5 successful breeding pairs in the Eastern Washington recovery region, 4 in the Northern Cascades recovery region, and 6 in the Southern Cascades and Northwest Coast recovery region.

The recovery objectives for downlisting and delisting wolves were developed from a combination of current scientific knowledge about wolves in other locations and in Washington, wildlife conservation and population viability principles, and discussion among the Wolf Working Group, with input from WDFW, scientific peer review, and an analysis of assumptions and risks. Fifteen breeding pairs, which represent an estimated 97-361 wolves, are considered minimal to achieve recovery. Several components of the delisting objectives serve to reduce the risk to long-term viability of a wolf population in Washington. These include the geographic distribution requirements across the three recovery regions, the use of successful breeding pairs as a measurement standard, and the three-year requirement for maintaining population robustness on the landscape. It is further recognized that the long-term viability of the state's wolf population will also depend, in part, on immigration from Idaho, Montana, British Columbia, and Oregon.

Persistence modeling suggested that as long as the population was allowed to grow and populate new areas, 15 successful breeding pairs was an adequate recovery objective for delisting. Given those modeling assumptions, there was little or no probability that the population would fall below the delisting goal during the 50 years. However, under scenarios that capped the population at 15 breeding pairs, there was a 93% probability that the wolf population would fall below the delisting goal of 15 breeding pairs during the 50 years and require relisting, even with immigration. With no immigration, the probability rose to 97%.

Translocation is a conservation tool available in the plan that could be used to move wolves from one recovery region to another if they failed to reach the recovery region through natural dispersal. If it were proposed, it would go through an extensive public review process.

The plan outlines a range of management options to address wolf-livestock conflicts. These include both proactive, non-lethal (e.g., modified husbandry methods and non-lethal deterrents) and lethal management options. Implementation of these will be based on the status of wolves to ensure that recovery objectives are met. Non-lethal management will be emphasized while the species is recovering and will transition to more flexible approaches as wolf recovery advances toward a delisted status. The plan includes a program to compensate livestock producers for livestock that is killed or injured by wolves. Under this plan, compensation would be paid for confirmed and probable wolf losses. The plan includes a two-tiered payment system, with higher payments on grazing sites of 100 or more acres where WDFW determines it would be difficult to survey the entire acreage, because it may be difficult to find carcasses on larger sites. Standard payments would be paid on smaller sites of less than 100 acres. The plan also includes working with a multi-interest stakeholder group to evaluate development of a program to compensate livestock owners for unknown losses. The ability to pay compensation will be dependent on available funding and the plan identifies tasks to pursue a variety of potential funding sources.

The effects that wolves will have on elk, deer, and other ungulate populations and hunter harvest are difficult to predict. In Idaho, Montana, and Wyoming, where wolf populations currently number more than 1,600 wolves, most elk and deer populations remain at or above management objectives. Wolves have contributed to declining elk populations in a few areas, but are usually one of several causes, including declining habitat conditions, past high human harvest, severe weather conditions, and predation by other predators. In the Great Lakes region, where there are about 4,000 wolves, white-tailed deer populations are thriving and often above local management goals, and annual hunter harvest has remained high. These data suggest that when wolf populations are recovering in Washington, little to no effect would be expected on elk and deer populations. As wolf population numbers increase in Washington in the future, they could have some localized impacts on ungulate abundance or habitat use, but a relatively small impact on a statewide level.

The plan includes management options to address local impacts, if they occur. If WDFW determines that wolf predation is a primary limiting factor for an “at-risk” ungulate population, and the wolf population in that wolf recovery region is healthy (i.e., it exceeds the delisting objectives for three consecutive years for that recovery region), WDFW may consider reducing wolf abundance in the localized area occupied by the ungulate population. Management options would include both non-lethal (e.g. moving them to other areas) and lethal measures; non-lethal options would be prioritized while the species is listed.

Two independent public attitude surveys conducted in 2008 and 2009 showed high overall support (~75%) for wolf recovery in Washington among the general public. Implementation of a public outreach and education program is a high priority in the wolf conservation and management plan. It includes providing information and outreach about wolves, living with wolves, preventing and addressing conflicts with livestock and dogs, and wolf-ungulate interactions. It also identifies a task to conduct public attitude and knowledge surveys to determine information needs and develop an outreach plan.

Because wolves are habitat generalists, restrictions on human development and other land use practices should not be necessary to recover wolves in Washington. Experience in the northern Rocky Mountains and the Great Lakes has shown that no restrictions, other than those occasionally needed to temporarily prevent excessive disturbance at occupied den sites, have been necessary to conserve wolves.

The plan provides an analysis of potential economic impacts (both negative and positive) to specific sectors of Washington's economy as wolves become reestablished in the state. At populations of 50 and 100 wolves, which roughly correspond with the upper levels of abundance during the state endangered and threatened phases, a few livestock producers could be affected. As wolf populations increase in numbers and distribution, more producers could be affected. Depending on funding availability, it is expected that most livestock losses would be offset by compensation programs and assistance with proactive measures. Similarly, populations of 50 and 100 wolves should have few negative effects on big game hunting overall. Larger populations are expected to have greater impacts on game abundance and hunting opportunity, but such impacts become increasingly difficult to predict. Washington could conceivably develop a wolf-related tourist industry, depending on where wolves reestablish, the population levels they achieve, and the ability of tourists to see or hear wolves. Wolf recovery is anticipated to have no economic impact on the state's forest products industry.

Adequate funding for implementing the activities described in this plan is vital to its success. The plan includes estimated costs for activities needed to accomplish important tasks in the first six years of the plan. WDFW will seek funding from a variety of sources, including special state and federal appropriations and private sources, and will initiate partnerships with universities, agencies, non-governmental organizations, and other entities to carry out wolf conservation and management actions in Washington.

---

## 1. INTRODUCTION

The gray wolf (*Canis lupus*) is an endangered species throughout Washington under state law (WAC 232-12-014, Appendix A) and under federal law (Endangered Species Act) in the western two-thirds of Washington. Wolves in the eastern third of Washington were removed from federal listing in May 2011 and are now under state management.

Historically, wolves were found throughout most or all of Washington. They were essentially extirpated from the state by the 1930s through trapping, poisoning, and shooting. Although wolf populations have been absent from Washington for more than 70 years, small numbers of individuals have periodically dispersed into the state during that time to the present.

This plan was developed as the first wolf packs were becoming reestablished in Washington. Increased dispersal of wolves into Washington, with the eventual reestablishment of a breeding population, is expected as a result of the recovery of wolf populations in the neighboring states of Idaho and Montana. Wolves are expected to disperse into northeastern Washington from Idaho, Montana, and British Columbia; into southeastern Washington from Idaho and Oregon; and into the North Cascades from British Columbia and northeastern Washington.

The Washington Department of Fish and Wildlife (WDFW) initiated development of a Wolf Conservation and Management Plan for Washington in response to the anticipated dispersal of wolves into Washington, the need for a state recovery plan per WAC 232-12-297, and the eventual return of wolves to state management. In January 2007, former WDFW Director Jeff Koenings, appointed 18 members to a Wolf Working Group (Appendix B) to advise WDFW in the development of the plan. The 18 stakeholders represented a broad range of perspectives and geographic distribution in Washington, and were expected to present those values in the development of the plan. The Working Group was reduced to 17 members during the course of its meetings, when one person was no longer able to participate.

The Working Group began meeting in February 2007. In giving direction to the group, Director Koenings noted that wolves are an important and valued component of a healthy ecosystem in Washington and that the reestablishment of a sustainable wolf population in Washington would only occur if there is a fair balance between conservation needs and the needs of the public. The expectation for the Working Group was that it would provide input to WDFW for key elements of the plan and critically review its content in light of biological, social, and political considerations.

The Director specified two “sideboards” for the group to work within:

- First, the option of managing for no wolves in Washington was not a viable alternative, and
- Second, WDFW would not reintroduce wolves to Washington from another state.

He also noted that the plan would not attempt to recover wolves to historical population levels; this would be an unattainable goal given the many changes to Washington’s landscape during the past 150 years. The Working Group was asked to strive for consensus, as much as possible, to guide the plan. Working Group meetings were facilitated by a professional negotiator, Paul De Morgan of RESOLVE.

The group met six times during 2007 and twice in 2008; seven public scoping meetings were also held throughout the state during August 2007. The Working Group developed a letter at the conclusion of the eighth meeting (see Appendix C, June 30, 2008 letter from the Group) to accompany the peer review draft. The letter described the many considerations that went into their negotiations to craft a balanced package of conservation and management recommendations that WDFW could use in the preparation of the peer review draft. While the letter represented the Working Group's thoughts at that stage of the plan's development, it still offers insights into the complex and diverse issues that must be addressed in crafting a balanced, fair, and cost effective plan that has a high probability of success.

The August 2008 version of the draft plan, which included the Working Group's recommendations, was sent out for peer review by WDFW. Forty-three reviewers with expertise on wolves, genetics, economics, state and federal wolf management, and other topics responded with critical reviews, comments, corrections, and suggestions (see Appendix D, List of Peer Reviewers). The results of the peer review and internal WDFW review were then incorporated into a new version of the draft plan completed in July 2009. The Working Group met in September 2009 to review the revised version and offer more comments, which were then incorporated in a Public Review Draft. The draft EIS/plan underwent a 90-day public review under the State Environmental Policy Act (SEPA) process from October 2009 to January 2010, including 12 public meetings throughout the state, and blind peer review by 3 anonymous reviewers. Nearly 65,000 people provided comments on the draft documents. WDFW addressed the public input and conducted additional internal review. The Working Group met in June 2011 to review the changes resulting from the public, blind peer, and internal WDFW reviews prior to completion of the final recommended plan and presentation to the Washington Fish and Wildlife Commission in August 2011 for consideration and approval.

WDFW's Listing and Delisting Procedures (WAC 232-12-297, Appendix A) require the development of recovery plans for species that are state listed as endangered or threatened and management plans for species listed as sensitive. These plans identify measurable recovery objectives and outline strategies to achieve those objectives so that the species can be downlisted and eventually delisted in the state. The Washington Wolf Conservation and Management Plan will meet the needs of a state recovery plan and at the same time will provide for management of wolves while they are state listed as endangered, threatened, and sensitive. A wide range of perspectives and values related to wolves and wolf management were heard in developing and refining the plan. The result is a plan that is intended to serve the broad interests of the citizens of Washington for both conservation and management of wolves in the state.

The conservation and management strategies in this plan are for state planning purposes only and conform only to the requirements of state law. There is no requirement for federal approval of the plan. Wherever wolves are federally listed in Washington, WDFW would consult and coordinate with the U.S. Fish and Wildlife Service prior to implementing management actions to ensure consistency with federal law. Washington was not included in the original Northern Rocky Mountain Wolf Recovery Plan (USFWS 1987); only the states of Idaho, Montana, and Wyoming were included. The federal delisting criteria for the Northern Rocky Mountain (NRM) distinct population segment (DPS) required Idaho, Montana, and Wyoming to have state wolf conservation plans, but did not require Washington to have a wolf conservation plan approved by the U.S. Fish and Wildlife Service.

There are no federal wolf recovery objectives for Washington, but the eastern third of the state was included in the NRM DPS when it was designated in 2007 to account for dispersing wolves from Idaho and Montana populations. While there is no federal recovery plan for wolves in the western two-thirds of Washington, the U.S. Fish and Wildlife Service has initiated a status review of wolves in the Pacific Northwest, including Washington, Oregon, and California (USFWS 2011a). The review will determine whether a Distinct Population Segment should be designated for the Pacific Northwest, and if so, will determine the status of wolves within the DPS. If a DPS were established, a federal recovery plan would be developed, which would include recovery objectives.

The purpose of the state plan is to ensure the reestablishment of a self-sustaining population of gray wolves in Washington and to encourage social tolerance for the species by addressing and reducing conflicts. The goals of the Washington Wolf Conservation and Management Plan are to:

- Restore the wolf population in Washington to a self-sustaining size and geographic distribution that will result in wolves having a high probability of persisting in the state through the foreseeable future (>50-100 years).
- Manage wolf-livestock conflicts in a way that minimizes livestock losses, while at the same time not negatively impacting the recovery or long-term perpetuation of a sustainable wolf population.
- Maintain healthy and robust ungulate populations in the state that provide abundant prey for wolves and other predators as well as ample harvest opportunities for hunters
- Develop public understanding of the conservation and management needs of wolves in Washington, thereby promoting the public's coexistence with the species.

To meet these goals, the plan includes such tasks as identifying and managing toward population objectives, developing a response strategy for conflicts, engaging in public outreach and education, and conducting ongoing monitoring and research. As specified in WAC 232-12-297, section 11.1, recovery or management plans are to include, but not be limited to: (1) target population objectives, (2) criteria for reclassification, (3) an implementation plan for reaching population objectives that will promote cooperative management and are sensitive to landowner needs and property rights, (4) public education needs, and (5) a species monitoring plan. The overall plan will estimate resources needed from and impacts to WDFW, other agencies (including federal, state, and local), tribes, landowners, and other interest groups. The plan will consider various approaches to meeting recovery objectives including, but not limited to, regulation, mitigation, land acquisition, incentives, and compensation mechanisms.

In developing this plan, WDFW sought to establish a wolf conservation program that is achievable, realistic, fair, flexible, cost-effective, defensible, sustainable, fundable, engages the public, and provides incentives for meeting wolf conservation goals. Several aspects of the plan are critical to its success. One of the first and foremost is to have broad support to ensure sufficient funding for implementing the plan. Conservation tools and strategies will need to be implemented to achieve a healthy, self-sustaining wolf population. Because human tolerance has been and remains the primary limiting factor for wolf survival, tolerance and acceptance must be adequately addressed for citizens who will be directly affected by the presence of wolves. This makes technical assistance, compensation, and outreach some of the highest priorities for wolf conservation. Actions minimizing conflict and effective enforcement against illegal actions harming wolves also are key parts of achieving conservation goals. An active outreach and education program must offer

1 guidance and information about living with wolves and about rules and regulations related to  
2 management. Recovery of wolves means recognizing them as a native species of Washington, with  
3 legal, social, cultural, and biological value, and having an important ecological role in maintaining  
4 native ecosystem functions and processes. Wolves will need to be managed in concert with other  
5 species, particularly primary prey and other large carnivores. While many of these species have their  
6 own management or recovery plans, none can be managed in isolation.  
7

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## 2. BACKGROUND

The chapter provides background information on a variety of subjects pertaining to wolves, as follows:

- the history of wolves in Washington and surrounding geographic areas (Section A)
- the current status of wolves in Washington and surrounding areas (Section B)
- the identification and biology of wolves (Section C)
- legal status of wolves in Washington under federal, status, and tribal law (Section A)
- public attitudes and cultural values towards wolves (Section E)

### A. History of Wolves in Washington and Surrounding Areas

Gray wolves were common throughout most of Washington before 1800. Some authors have suggested that wolves did not occur in the Columbia Basin (Young and Goldman 1944, Booth 1947, Dalquest 1948), but this is seemingly contradicted by several reports. Douglas (1914) occasionally observed wolves while traveling in shrub-steppe areas between The Dalles, Oregon, and Walla Walla in March 1826, whereas Suckley and Cooper (1860) described them as abundant in this same area and habitat in the mid-1850s despite the absence of large ungulate prey. Records also exist of wolves in the vicinity of the Walla Walla Valley (Wilkes 1844) and in southern Grant County (Dalquest 1948; see Appendix E for a map of counties in Washington).

Typical winter wolf densities range from about 46-98 wolves/1,000 square miles across much of the northern United States and southern Canada (Fuller et al. 2003). Applying these densities to derive a historical population estimate for Washington (land size = 67,578 square miles), but using reduced densities for the Columbia Basin (estimates of 12-25 wolves/1,000 square miles; size = 22,754 square miles), suggests that the state held about 2,300-5,000 wolves before Euro-American settlement.

### Fur Trading, Bounties, and Extermination in Washington

Trapping of wolves as a commercial source of fur began in earnest during the 1820s following the establishment of the Hudson's Bay Company in the Pacific Northwest. The company initiated an elaborate trading system with Native Americans across the region. Fur trading occurred at four forts located in Washington (Figure 1). From 1821 to 1859, a total of 14,810 wolf pelts were traded at the following locations: Fort Nez Perces, located at the junction of the Columbia and Walla Walla Rivers, 8,234 pelts; Fort Colville located along the Columbia River in present-day Stevens County, 5,911 pelts; Fort Vancouver located at present-day Vancouver, Clark County, 416 pelts; and Fort Nisqually in southern Puget Sound, 249 pelts (Hudson's Bay Archives 1988, Laufer and Jenkins 1989). These totals include animals taken not only from Washington, but originating from parts of British Columbia, Idaho, Oregon, and perhaps western Montana as well.

Despite the fur trade, wolves remained common in many areas of Washington into at least the 1850s. In 1839, Elkanah Walker reported that wolves were "thick" at Tshimakain mission (near present-day Ford in Stevens County), making it necessary to corral horses at night for protection (Gibson 1985: 176). Wolves were also a problem at Cowlitz Farm (operated by the Hudson's Bay

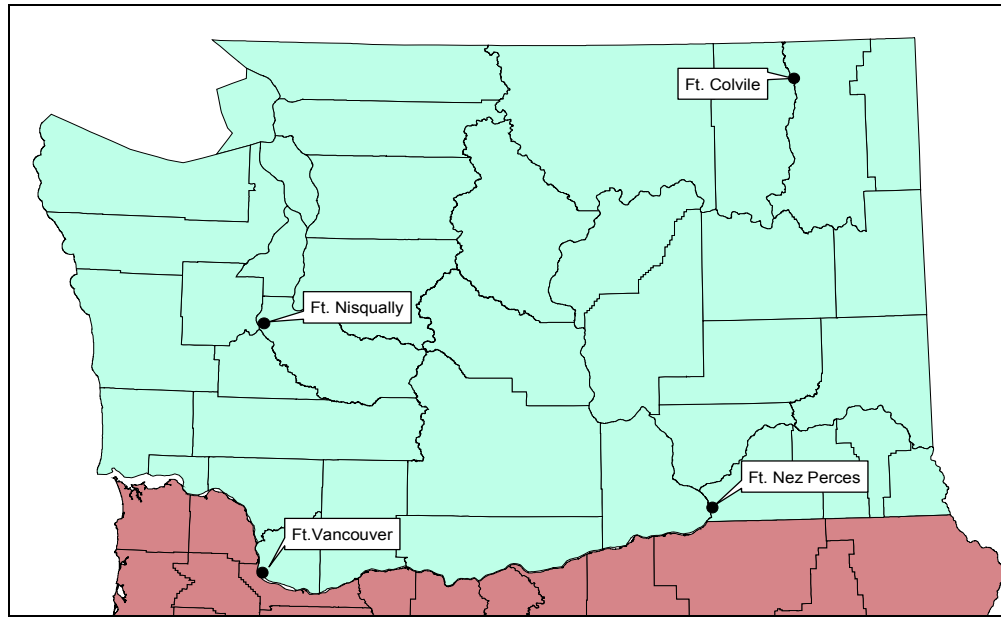


Figure 1. Map of present-day Washington (with counties) showing locations of the four main fur trading posts operated by the Hudson's Bay Company from 1827 to 1859.

Company near present-day Toledo in Lewis County) in 1841 and required “large numbers of cattle ..... [to be brought in each] night, which is a very necessary precaution ..... in consequence of the numerous wolves that are prowling about; in some places it becomes necessary for the keeper to protect his beasts even in the daytime” (Wilkes 1844). Joseph Drayton of the Wilkes expedition remarked in 1841 that “wolves were very numerous ... and exceedingly troublesome” between Fort Walla Walla (at its initial site along the Columbia River) and the Whitman mission in present-day Walla Walla County (Wilkes 1844). Joseph Heath, an early resident of western Washington, noted that wolves were “very common” on the Nisqually Plains (present-day Pierce County) during the winter of 1844-1845 (Heath 1979:14-15). Suckley and Cooper (1860), who visited Oregon and Washington Territories from 1853 to 1857, described wolves as “exceedingly numerous ..... from the Cascades to the Rocky Mountain Divide.” They also reported that wolves were abundant in the headwaters of the rivers flowing into the Columbia River from the Cascades and the Blue Mountains, and stated that abundance had increased after the introduction of sheep into the region. As late as 1889, Linsley (1889) described the region near the Pend Oreille River as being “..... full of black and silver gray wolves.....” He and his partner trapped or shot 40 wolves in the area during the winter of 1888-1889. Wolves were also remained common parts of the Olympic Mountains in 1890 (Lien 2001:137, 322).

Euro-American settlement of the Pacific Northwest brought immediate efforts to control wolves. The Hudson's Bay Company used strychnine for poisoning wolves at its early farming operations in Washington and set high prices on wolf skins to encourage killing by Native Americans (Heath 1979: 32; Gibson 1985: 120). Residents of the Oregon country (which included Washington) convened their first “Wolf Meeting” in 1843 and established a \$3.00 wolf bounty (Young 1946, Laufer and Jenkins 1989). During an 18-month period in 1841-1842, a shepherd at Nisqually Farm killed more than a hundred wolves (Gibson 1985: 120). By the mid-1850s, wolves had become

“quite scarce” on the Nisqually Plains because of poisoning efforts to protect local sheep herds (Suckley and Cooper 1860).

Although poorly documented, wolves were heavily persecuted during the last half of the 1800s as ranching and farming became established in the state, and were eliminated from most areas by 1900 (Dalquest 1948). Poisoning, trapping, and shooting were common control techniques, and a bounty of \$15 per wolf was paid by the state in the early 1900s (Harding 1909, Adamire 1985). Wolf populations held out somewhat longer in a few more remote locations. One of these was on the Olympic Peninsula, where estimates of 115 wolves in 1910 and 40-60 wolves in 1919 were made (Webster 1920, Scheffer 1995). However, this population declined rapidly thereafter and was nearly gone by the late 1930s (e.g., Scheffer 1995, Beebe no date). Adamire (1985) reported that bounties were paid on 46 wolves by the Clallam County auditor’s office from 1906-1929. Johnson and Johnson (1952) remarked that sightings by experienced observers suggested that a few wolves may have continued to persist in the Queets River drainage and perhaps elsewhere in the Olympic Mountains until as late as the early 1950s. Murie (1935) recommended as early as 1935 that consideration be given to reintroducing wolves to the Olympic Mountains.

Elsewhere, wolves remained in the southern Cascades until at least 1915, but had disappeared as a resident population by 1941 (Young and Goldman 1944). A few animals also persisted in the vicinity of Mt. Rainier until the 1920s, but Taylor and Shaw (1927, 1929) considered them “rare and of irregular occurrence” in the national park. Macy (1934) reiterated the rarity of the species at the park. Predator control efforts by the National Park Service and U.S. Bureau of Biological Survey at Mt. Rainier during the 1910s or 1920s (Cahalane 1939) may have contributed to the demise of wolves there. Dalquest (1948) reported that a few wolves might have survived in the northern Cascades between Lake Chelan and Mount Baker until at least the 1940s. A “band of a dozen wolves” was reported in the Aeneas Valley of eastern Okanogan County in 1914 (Hansen 1986). Booth (1947) gave evidence that a few wolves remained in the Blue Mountains until 1915 or perhaps later. The U.S. Forest Service estimated that only about 10 wolves in total survived on all national forest lands in the state by 1939 (Young and Goldman 1944).

Further illustrating the rarity of wolves in Washington by the early 1900s, extensive predator control work by federal trappers from the U.S. Bureau of Biological Survey succeeded in killing just 10 wolves on or near Forest Service lands in 1907 (Harding 1909) and only two wolves statewide between 1915 and 1929 (United State Congress 1929). Scattered records of wild wolves killed and reliable sightings were made at various localities from about 1916 into the 1950s. A sampling of these appears in Table 1. It seems likely that many of these individuals were dispersers from neighboring states and British Columbia rather than the survivors from remnant breeding populations.

Reports of wolves continued to occur in Washington during the next few decades, with greater effort devoted to documentation of records during the 1970s and 1980s. Sixty-eight records of the species held in the WDFW Heritage database for 1970-1989 were largely restricted to the Cascade Mountains and parts of northeastern Washington. Hansen (1986) summarized 42 reports from northeastern Washington made from before 1960 to 1985. Records were compiled from a variety of sources, including unpublished accounts, reports from the public, and trapper questionnaires. Twenty-four records were judged as probably accurate and 18 were possibly accurate. Eighteen originated from before 1960 to 1973 and 24 were from 1974 to 1985. Five records involved three or

1 Table 1. Miscellaneous reports of wolves in Washington from 1916 to the 1950s.

Location	Date	Record	Source
Sluiskin Falls, Mt. Rainier National Park	1916	Two seen	Taylor and Shaw (1927)
Near Nisqually Glacier, Mt. Rainier National Park	1916	One killed	Taylor and Shaw (1927)
Skate Mountain, Lewis County	1916	Three heard	Taylor and Shaw (1927)
Elwha, Hayes, and Lost rivers, Press Valley, Jefferson Co.	1916-1917	Tracks seen	Murie (1916-1917)
Near the former community of Wahluke, Grant Co.	1917	Two killed	Dalquest (1948) <sup>a</sup>
Clallam County	1917-1929	Bounties paid for 22 killed	Adamire (1985)
Cameron Creek, Jefferson Co.	1919	One trapped	Cameron (1949)
Elwha River drainage, Jefferson Co.	1920	One killed	Museum specimen <sup>b</sup>
Paradise Valley, Mt. Rainier National Park	1920	Tracks seen	Taylor and Shaw (1927)
North fork of the Quinault River, Jefferson Co.	About 1920	Two killed	Dalquest (1948)
Whatcom Co.	1922	Two sightings	Edson (1931)
Skamania Co.	1924	One killed	Guenther (1952)
Skagit Co.	1927	Bounty paid for one killed	Edson (1931)
Snohomish Co.	1927	Bounty paid for one killed	Edson (1931)
Snow Creek, Clallam/Jefferson Co.	1929	One seen	Scheffer (1995)
Snow Creek, Clallam/Jefferson Co.	1930	One seen	Scheffer (1995)
Near Tonasket, Okanogan Co.	1930	One trapped	Guenther (1952)
Near Prouty Mountain, Pend Oreille Co.	1932	One reported	Hansen (1986)
Near Camp Muir at Mt. Rainier National Park	About 1933	One seen	Macy (1934)
Twin Peaks, Snohomish Co.	1936	One killed	Booth (1947)
Near Granite Falls, Snohomish Co.	About 1945	One killed	Larrison (1947) <sup>c</sup>
Gray Wolf Creek, Clallam Co.	1946	Tracks seen	Scheffer (1995)
Monte Cristo area, Snohomish Co.	1940s	Tracks at several sites	Larrison (1947)
Taylor Ridge about 12 mi east of Republic, Ferry Co.	1950	One killed	Guenther (1952)
Near Curlew, Ferry Co.	1951	Two seen	Hansen (1986)
Sheep Creek drainage in northern Stevens Co.	Early 1950s	Four seen and heard	Hansen (1986)
North of Slate Creek, Pend Oreille Co.	1955	One seen	Layser (1970)

<sup>a</sup> Dalquest (1948) reported these as the last wolves killed in the Columbia Basin.

<sup>b</sup> This specimen (USNM 241614) is held at the National Museum of Natural History, Washington, D.C.

<sup>c</sup> Larrison (1947) also reported that he saw and heard a wolf near Pinnacle Lake, Mt. Pilchuck, Snohomish County, in August 1946, but the small size of the animal's tracks (2 inches by 3 inches) make this sighting doubtful.

more wolves, 10 were of two wolves, and 27 were of single animals; most reports of two or more wolves originated from 1973 or earlier. Two-thirds of the reports after 1973 came from the eastern half of the Colville National Forest, with most obtained from the Slate Creek/Sullivan Creek area on the east side of the Pend Oreille River. One wolf was killed near Mansfield, Douglas County, in 1975. Hansen (1986) gave brief descriptive accounts of many of these records.

Laufer and Jenkins (1989) compiled a similar account of wolf records from the Cascades for 1946 to 1988. Reports from this area represented 70% of all reports from the state during this period. A total of 49 reports came from the Cascades during 1973-1988. Thirty-one of these were analyzed in greater detail, with 19 rated as probably accurate and 12 as possibly accurate. Two records involved three or more wolves, five were of two wolves, and 24 were of single animals. These records were concentrated in the Baker Lake and Ross Lake areas of the North Cascades and in the vicinity of Mount Rainier.

Almack and Fitkin (1998) reviewed 913 reports of gray wolves in Washington from 1834 to 1994. Of these reports, 78 were judged to be confirmed observations: 55 were primarily bounty records from 1834 to 1929 (e.g., see Adamire 1985), three were from 1944 to 1975, and 20 were sighting or howling reports from 1989 to 1994.

#### History of Wolves in Neighboring States and British Columbia

As in Washington, wolves were formerly common and widely distributed in Oregon, Idaho, Montana, and Wyoming, but experienced serious declines following the arrival of Euro-American settlers and expansion of the livestock industry (Young and Goldman 1944). Bounties were enacted in the 1870s and 1880s in each of these states and contributed to declines. For example, 4,540 wolf hides were presented for payment in the first year of Montana's statewide bounty in 1884 (MFWP 2003). Prey scarcity caused by the elimination of bison and reductions of other ungulates also impacted wolves in Montana and Wyoming. Wolf numbers were severely reduced in these four states by the early 1900s and self-sustaining populations were virtually eliminated by 1930 (Robinson 2005). One exception to this occurred on national forest lands in the Oregon Cascades, where an estimated 130 animals remained in 1939 (Young and Goldman 1944); these animals were gone too by the 1940s. Scattered reports of sightings, tracks, and scat continued in these states (especially Montana and Idaho) into the 1970s and 1980s, with most animals thought to represent dispersers from Canada. In 1986, the first documented wolf den in Montana in more than 50 years was discovered in Glacier National Park (MFWP 2003).

Wolves originally occurred throughout British Columbia, but were eliminated from most of the southern portion of the province by 1930 and became fairly uncommon in remaining areas (Pisano 1979, Tompa 1983, Boitani 2003). Province-wide populations fell to their lowest levels during the 1920s and 1930s (Tompa 1983, Hayes and Gunson 1995). Numbers generally began recovering thereafter (except during a period of resumed control during the 1950s) and most of British Columbia was again occupied by the early 1990s, with the exception of the southernmost mainland from Vancouver to Nelson (BCMELP 1988, Hayes and Gunson 1995). Reoccupation of the East Kootenay region in the southeastern portion of the province did not occur until about 1980 (G. Mowat, pers. comm.).

### **B. Current Status of Wolves**

#### Washington

Washington experienced a flurry of reported wolf activity during the early 1990s, primarily in the North Cascades, which presumably involved animals originating mostly from southern British Columbia. Adult wolves with pups were detected at two locations in the North Cascades in the summer of 1990. One of these sites was in the Hozomeen area of the Ross Lake National Recreational Area, where animals were present for more than a month (Church 1996, Almack and Fitkin 1998) and were again documented (without breeding evidence) in 1991, 1992, and 1993. It was later learned that a pet wolf released in this area in the early 1990s (Martino 1997) was responsible for some of these sightings (S. Fitkin, pers. comm.). The second location occurred northwest of Winthrop near the Pasayten Wilderness (Anonymous 1990, Gaines et al. 2000). Howling surveys conducted in the Okanogan and Wenatchee National Forests from 1991 to 1993 resulted in two confirmed wolf responses in backcountry areas, with one involving multiple

individuals in the Lake Chelan-Sawtooth Wilderness and the other being a lone individual in the Alpine Lakes Wilderness (Gaines et al. 1995; W. Gaines, pers. comm.). A sighting of a wolf with pups was also reported in the North Cascades in July 1996 (Church 1996). Additionally, one wolf was found dead near Calispell Lake in southern Pend Oreille County in May 1994 (Palmquist 2002; WDFW, unpubl. data). This animal was radio-collared and had immigrated from northwestern Montana.

Overall, from 1991 to 1995, Almack and Fitkin (1998) reported 20 confirmed wolf sightings in Washington. Sixteen of these were made in the Cascades and four in Pend Oreille County, although these records were probably biased towards observations in the Cascades. Almack and Fitkin (1998) concluded that small numbers of wolves existed in Washington, mostly as individuals and with one or two possible breeding packs that did not persist. No evidence of large packs or a recovering population was detected. Almack and Fitkin (1998) also confirmed the presence of free-ranging wolf-dog hybrids in the state and believed that a significant number of reported wolf observations probably represented hybrid animals.

Wolf reports in Washington declined from 1996 to 2001, probably due mainly to a reduced emphasis on data collection. However, reports began increasing again in about 2002 (WDFW, unpubl. data), as summarized in the following sections. This was likely a reflection of increased dispersal of wolves into Washington from adjacent recovering populations in Idaho and Montana, and resumed efforts by agency biologists and others to obtain and follow up on reports and to place remote cameras in the field.

#### *Northeastern Washington*

Many of the wolf reports in Washington between 2002 and 2007 originated from Pend Oreille and Stevens counties. These included a radio-marked female that dispersed from northwestern Montana and spent several weeks in northern Pend Oreille County in February 2002. It used sites near Metaline Falls and the Salmo-Priest Wilderness (Palmquist 2002) before leaving the area and moving into British Columbia. Several individual wolves were photographed by remote cameras at different locations in Pend Oreille County in 2007. A calf depredation in northernmost Stevens County in late August 2007 was attributed to one or more wolves by USDA Wildlife Services (R. Woodruff, pers. comm.).

In 2008 and again in May 2009, a probable mated pair (including a lactating female in 2009) was photographed by remote cameras in Pend Oreille County. DNA analysis of hair collected in 2009 verified the presence of a male wolf linked genetically to the southern Alberta-northwestern Montana-northern Idaho population (J. Pollinger, pers. comm.). Citizen reports, howling surveys, and remote cameras confirmed the presence of a breeding pack (named the Diamond Pack) in July 2009. The pack produced six pups in 2009, with at least four surviving until 2010. The breeding male was captured and radio-collared in July 2009 and a yearling female was radio-collared in 2010. The pack produced a litter of six pups in 2010 and numbered 12 wolves at the end of the year. The pack's home range covers about 350 square miles, with about 25% of its territory in Idaho. Den sites in 2009, 2010, and 2011 were confirmed to occur in Washington.

A pup belonging to a second pack (Salmo Pack) was trapped and radio-collared in northern Pend Oreille County in August 2010. Four adult-sized animals were seen on several occasions in the

winter of 2010-2011, but the pack was not confirmed to contain a successful breeding pair (2 or more pups surviving until December 31). Although the den location has not yet been determined, sufficient telemetry locations were obtained in 2010 and 2011 to confirm that the pack is using both Washington and British Columbia, and that denning likely occurs in Washington. Confirmation of the den's location will determine whether this is counted as a Washington or British Columbia pack.

A third pack (Smackout Pack), located in west-central Pend Oreille County, was confirmed in July 2011. This pack was known to contain at least two adults and three or more pups as of July 2011; and one of the pups was captured and ear-tagged. Based on previous sighting reports and tracks in the area, this pack possibly existed in 2010, although there were no reports of adults and pups.

A radio-collared pup from a pack in Idaho (Cutoff Peak Pack) used a small segment of northeastern Pend Oreille County in 2010 and 2011. This pack occurs primarily in Idaho, where it presumably dens, and also extends into British Columbia (USFWS et al. 2011).

#### *Northern Cascades*

Multiple wolf reports from Okanogan County in 2008 led to confirmation of the first fully documented (through photographs, howling responses, and genetic testing) breeding by a wolf pack in Washington since the 1930s. A pack (named the Lookout Pack) with at least four adults/yearlings and six pups was confirmed in the western part of the county and adjacent northern Chelan County in the summer of 2008, when the breeding male and female were captured and radio-collared, and other pack members were photographed. Preliminary genetic testing of the breeding male and female suggested they were descended from wolves occurring in (1) coastal British Columbia and (2) northeastern British Columbia, northwestern Alberta, or the reintroduced populations in central Idaho and the greater Yellowstone area (J. Pollinger, pers. comm.).

The pack produced another litter of at least 4 pups in 2009, as well as a probable litter in 2007 based on a sighting report of 6-8 animals in nearby northern Chelan County in September 2007 (R. Kuntz, pers. comm.) and a report of 7-9 animals in Okanogan County in the winter of 2007-2008. The pack appears to have suffered significant human-caused mortality from illegal killing. In June, 2011, a federal grand jury indictment included the alleged killing of up to five wolves in 2008-2009, believed to be members of the Lookout pack. In May 2010, the Lookout breeding female disappeared several weeks after the suspected birth of a litter. This appeared to cause a breakdown in pack structure, with the breeding male ranging more widely and spending most of the summer alone. This pack was not considered a breeding pair at the end of 2010. However, sightings of multiple wolves (including the breeding male) traveling together in the winter of 2010-2011 indicate there are still two wolves inhabiting the Lookout Pack's territory. The pack occupied an area totaling about 350 square miles from 2008 to 2010.

Another pack (Teaway Pack) was confirmed in north-central Kittitas County in June 2011, when the pack's breeding female was trapped and radio-collared. Evidence from remote cameras and other sources indicates that the pack held 3-4 adults and an unknown number of pups at that time, and that it probably existed in 2010. Genetic analysis revealed that the Teaway female was likely a recent descendant of the Lookout male and female wolves originally radio-collared in 2008 (J. Pollinger, pers. comm.).

Tracks and scat that appeared to be from two wolves were found in the Ross Lake/Hozomeen area of North Cascades National Park in 2010 and remote cameras photographed two animals in this area during winter 2011. Further evidence collected in the spring of 2011 suggests that a pack is using this area, but that denning likely occurred in British Columbia rather than Washington.

### *Blue Mountains*

There have been multiple reports of wolves in the Blue Mountains dating back to at least 2006. These include reports of 2-6 wolves in Asotin, Garfield, Columbia, and Walla Walla counties from 2008 to 2011 (P. Wik, pers. comm.) and a radio-collared female dispersing from an Oregon pack in early 2011. One or possibly two packs are probably present on the Washington side of the Blue Mountains, but remain unconfirmed. One or both of these likely spend significant amounts of time in adjacent areas of Oregon.

### *Statelide Summary*

Wolf presence in Washington has expanded substantially since 2002. In July 2011, there were five confirmed packs in the state: two in Pend Oreille County (Diamond, Salmo), one in Pend Oreille and Stevens counties (Smackout), one in Kittitas County (Teanaway), and one in Okanogan/Chelan counties (Lookout) (Figure 2). Only one (Diamond) was a successful breeding pair in 2010. There were also indications of single additional packs in the Blue Mountains and North Cascades National Park, which are likely trans-boundary packs with Oregon and British Columbia, respectively. At least a few solitary wolves also likely occur in other scattered locations of Washington.

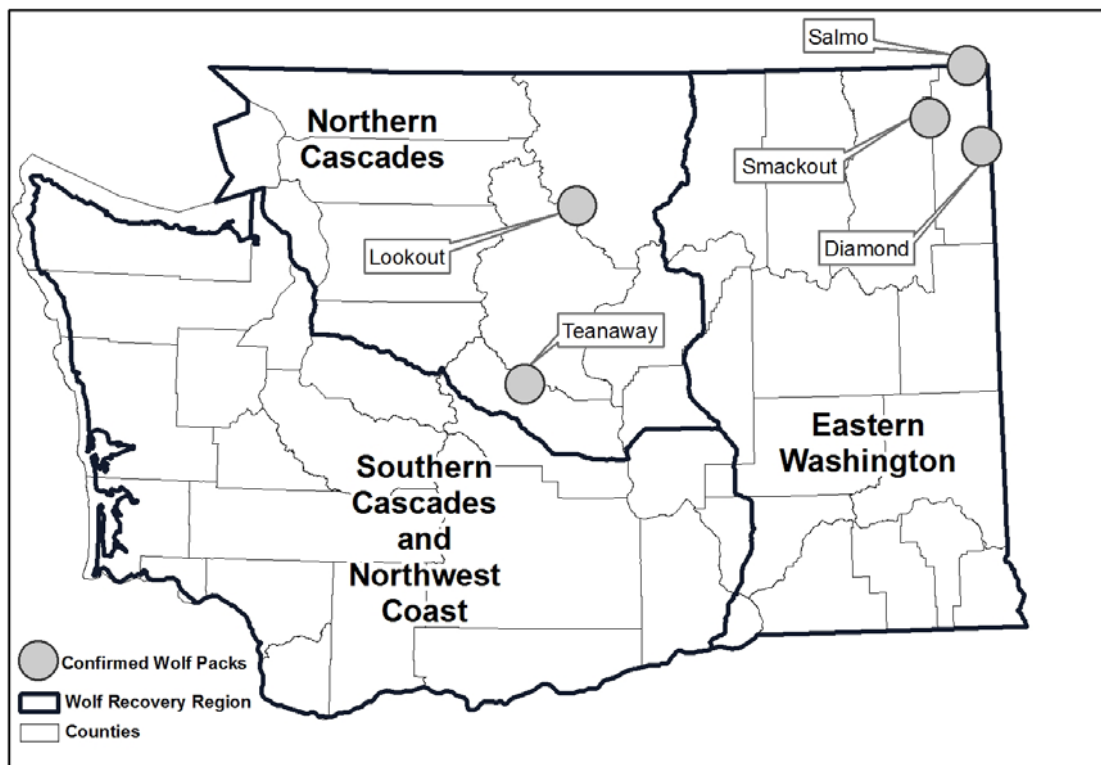


Figure 2. Distribution of confirmed wolf packs within recovery regions in Washington as of July 2011.

WDFW and others have also continued to document the presence of released or escaped hybrid wolves and pet wolves in the wild in Washington (Martino 1997, Palmquist 2002; WDFW, unpublished data).

#### Neighboring States and British Columbia

Wolf numbers in Montana, Idaho, and Wyoming have grown steadily since the mid-1980s and totaled at least 1,614 animals in 240 recognized packs and 108 breeding pairs in 2010 (USFWS et al. 2011). Natural recolonization of these states began in 1979, when wolves reentered the area near Glacier National Park in northwestern Montana from Alberta. Breeding in this area was first detected in 1986. Dispersers from the park and neighboring areas of Canada gradually recolonized other parts of northwestern Montana over the next decade. In 1995 and 1996, wolves were reintroduced into Yellowstone National Park and central Idaho by the U.S. Fish and Wildlife Service (Bangs et al. 1998), and have also contributed to expanding populations in the three states. This growth allowed the wolf population in the northern Rocky Mountain states to meet the biological recovery levels set by the U.S. Fish and Wildlife Service by the end of 2002 (MFWP 2003). At the close of 2010, wolf numbers totaled 705 in Idaho, 566 in Montana, and 343 in Wyoming (USFWS et al. 2011). Wolves are currently distributed primarily in western Montana, central and northern Idaho, and northwestern Wyoming. Several packs in northern Idaho occur within about 30 miles of Washington (USFWS et al. 2011).

Regulated hunting seasons for wolves were held in Idaho and Montana in 2009-2010 while wolves were federally delisted (USFWS et al. 2010, 2011). Hunter take totaled 186 animals in Idaho and 72 animals in Montana. Both states intend to resume public hunting of wolves upon federal delisting. As of April 2011, it is unknown what wolf population sizes that Idaho, Montana, and Wyoming will manage for after federal delisting.

Oregon's wolf population is in the early stages of development, much like the one in Washington. Between 1999 and early 2008, verified reports of wolves in Oregon totaled five solitary animals and one pair, all of which occurred in the northeastern corner of the state (Jacoby 2007, Cockle 2008, ODFW 2010). At least four of these animals were immigrants from Idaho and either died from human-related causes or were caught and returned to their original source. Four packs have been documented in this region since 2008, with breeding confirmed in two packs (USFWS et al. 2010, 2011). As of early 2011, one pack with 15 wolves was located in eastern Wallowa County, while two other packs with 6 wolves and 3-4 wolves were confirmed in areas of the Blue Mountains adjacent to Washington (R. Morgan, pers. comm.). An additional pack comprised of a yearling male and yearling female was lethally removed in September 2009 after multiple livestock depredations in Baker County. Northeastern Oregon also holds a small number of lone wolves (R. Morgan, pers. comm.). In addition to these records, unconfirmed reports of wolves are regularly made in Oregon (e.g., 204 were received by the Oregon Department of Fish and Wildlife in 2008) and come primarily from several northeastern counties. Under current Oregon state law, wolves are listed as endangered and are fully protected in the state.

Population estimates of wolves are not available for southern British Columbia, but anecdotal evidence suggests that much of the southwestern mainland has experienced a recent increase in wolf abundance (Pynn 2008; D. Reynolds, pers. comm.). Wolves in this region occur south to the Washington border, with some breeding known in or near Skagit Valley Provincial Park. Wolves

remain largely absent in the zone along the Washington border from Manning Provincial Park eastward to Creston, although a few animals are sporadically detected (B. Harris, pers. comm.; G. Mowat, pers. comm.). Numbers appear to be growing north of Kelowna (B. Harris, pers. comm.). Wolf recovery has continued in southeastern British Columbia, with harvest numbers suggesting increased abundance since the mid-1990s (Mowat 2007). However, wolves remain quite scarce in the West Kootenay region, including along the border of northeastern Washington (Mowat 2007; G. Mowat, pers. comm.). Wolves are considered common on Vancouver Island (D. Reynolds, pers. comm.). Recent research indicates that wolves located along and near the coast of British Columbia are genetically differentiated from those occurring in the interior of the province (Muñoz-Fuentes et al. 2009).

Current wolf management in southern British Columbia allows a 9- to 12-month hunting season in the Kootenay region (including along the borders of Stevens and Pend Oreille counties of Washington), with an annual bag limit of four animals or no bag limit at all. There are also 5.5- and 12-month trapping seasons with no bag limit. The province has a policy of removing wolf packs that threaten the recovery of mountain caribou. Wolves were killed for this reason at several locations in 2008, including east of Creston near the Idaho border, but there are no plans to do so near the Washington border (G. Mowat, pers. comm.). Wolves are currently protected from hunting and trapping in the Okanagan region, but a hunting season may be proposed (B. Harris, pers. comm.). Wolves are also protected from both types of harvest in the southern portion of the management region covering the southwestern mainland.

## C. Biology

### Physical Characteristics

In Montana, typical weights of adult gray wolves are 90-110 pounds for males and 80-100 pounds for females. Wolves in the greater Yellowstone area are somewhat heavier, with winter-captured adult females averaging 108 pounds, immature females averaging 96 pounds, and immature males averaging 107 pounds (Smith et al. 2000). Smith and Ferguson (2005) reported a maximum weight of about 130 pounds among males at Yellowstone. About half of the wolves in Montana are black, most of the remainder are gray, and a few are white. Both black and gray color phases can be found in a pack or in one litter of pups. Animals with dark pelage sometimes progressively change to white over time, perhaps due to old age, physiological stress, or genetic factors (Gipson et al. 2002).

Observers sometimes mistake coyotes for wolves, but a number of physical features separate the two (Figure 3). Wolf tracks are typically 4.0-4.5 to 5.0-5.5 inches long (Harris and Ream 1983) and are noticeably larger than those of coyotes (2.0-2.5 inches long).

Some large domestic dog breeds and wolf-dog hybrids may also be misidentified as wolves. Wolves can be distinguished from dogs by their longer legs, larger feet, wider head and snout, narrow body, and straight tail. Other identifying characteristics require closer examination than is possible in field settings with live animals. Some wolf-dog hybrids are indistinguishable in appearance from wild wolves, but characteristics that can be used to distinguish them from wolves include a curled tail, broader chest, shorter legs, and a distinct husky mask. In many instances, behavior distinguishes wild wolves from hybrids and dogs (Boyd et al. 2001, Duman 2001).

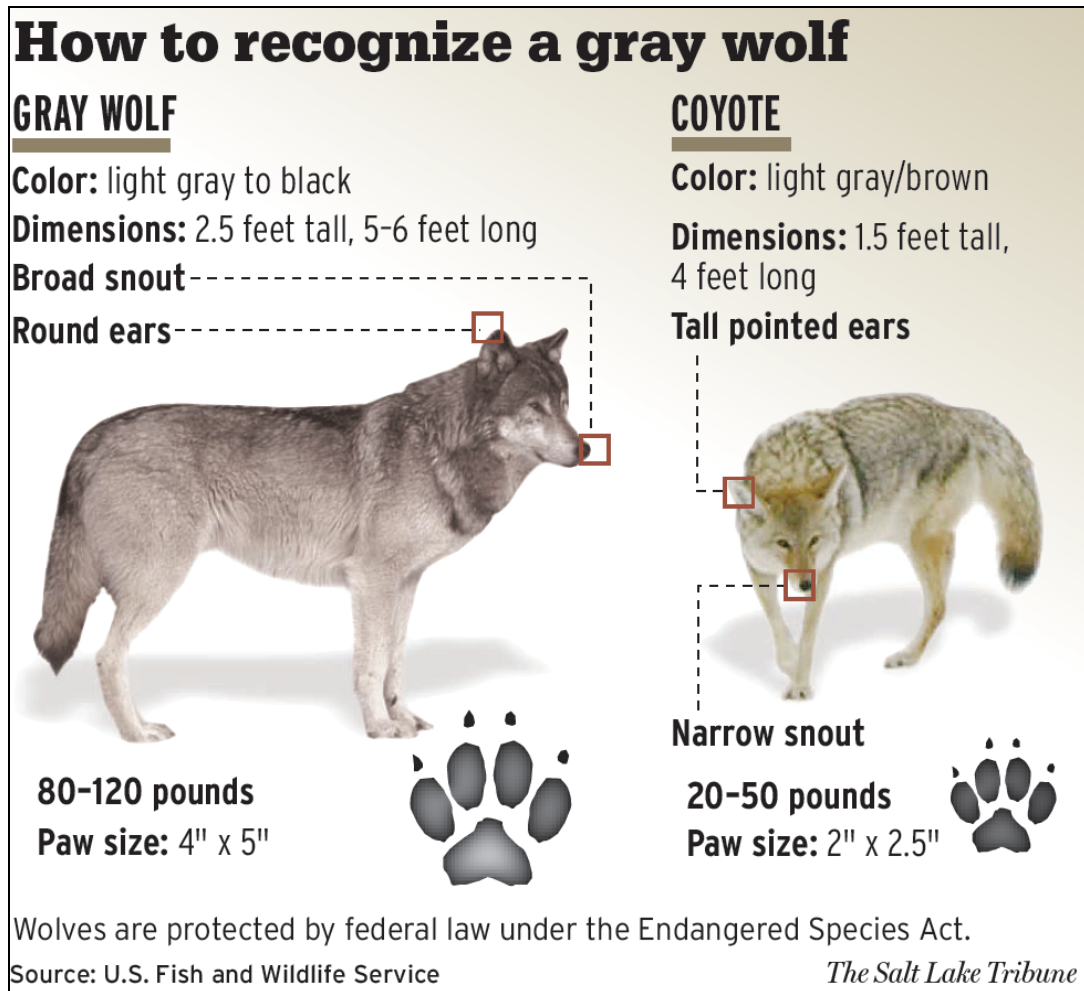


Figure 3. Identification characteristics used to distinguish wolves from coyotes.

### Behavior

Gray wolves are highly social and live in packs (Mech and Boitani 2003a). Packs are formed when male and female wolves develop a pair bond, breed, and produce pups. The pack typically consists of a socially dominant breeding pair, their offspring from the previous year, and new pups. Other breeding-aged adults may be present, but they may or may not be related to the others (Mech and Boitani 2003a). The pack hunts, feeds, travels, and rests together. Maintaining the pack social unit is important for acquiring food (Sand et al. 2006, Stahler et al. 2006) and enhancing pup survival (Brainerd et al. 2008). The pack also shares pup-rearing responsibilities, including hunting and tending pups at the den or at a series of rendezvous sites.

Pack size is highly variable (Mech and Boitani 2003a). Populations that are rapidly growing and expanding often consist of smaller packs, whereas those that are well established and have slow growth rates tend to have larger packs if adequate food is available (Mitchell et al. 2008). Pack size may also be related to prey size. Packs feeding primarily on deer tend to be smaller than those preying on elk, while those feeding mainly on moose or bison are often the largest (Smith and

Ferguson 2005). In six regions of Idaho, Montana, and Wyoming, average pack size ranged from  $5.1 \pm 1.1$  (SD) to  $9.9 \pm 2.6$  wolves from the time of population reestablishment to 2005, with the highest average occurring in Yellowstone National Park (YNP) (Mitchell et al. 2008). Smith and Ferguson (2005) reported a maximum pack size of 37 animals at YNP. Packs in these states are often dynamic and commonly fail to persist from one year to the next (Smith and Ferguson 2005, USFWS et al. 2011). This can be due to a number of reasons, including mortalities to key pack members, poor pup production, and lethal control actions.

Pack membership typifies the predominant manner in which wolves exist in the wild. The pack is the mechanism by which wolves reproduce and populations grow. However, in most wolf populations, some lone nomadic individuals exist as dispersers. These animals spend time looking for vacant habitat, waiting to be found by a member of the opposite sex within a new home range, or searching for an existing pack to join. Lone wolves typically comprise up to 10-15% of a population (Fuller et al. 2003). This is a temporary transition. Lone animals in northwestern Montana usually found other wolves in an average of 66 days (range 2-202 days) (Boyd and Pletscher 1999).

Wolves display a number of behaviors that help populations maintain genetic diversity through avoidance of inbreeding. These include a strong avoidance for mating with related pack members, dispersal by males to established packs where mating can occur with unrelated individuals, females remaining in their birth packs to become subordinate breeders, and females dispersing to form new packs and becoming dominant breeders (vonHoldt et al. 2008).

### Reproduction

Wolves normally do not breed until at least two years of age (Fuller et al. 2003). Breeding usually occurs only between the dominant male and female in a pack. In the northern Rockies, mating peaks in mid- to late February (Boyd et al. 1993). Wolves localize their movements around a den site and give birth in late April after a 63-day gestation period. Dens are usually underground burrows, but can occur in a variety of other situations, including abandoned beaver lodges, hollow trees, and shallow rock caves. Dens are commonly located near the central core of territories in on hillsides or in other elevated dry areas with loose soils near freshwater and greater vegetation cover (Trapp et al. 2008, Person and Russell 2009, Unger et al. 2009). Wolves often tolerate some limited human disturbance of dens, especially when pups are younger than six weeks of age, and regularly continue using disturbed den sites in subsequent years (Thiel et al. 1998, Frame et al. 2007, Person and Russell 2009). However, wolves sometimes respond to human disturbance near active dens by abandoning the location and moving their pups to other sites. Pups are moved to a series of rendezvous sites after reaching about eight weeks of age, which is about the time that weaning occurs.

Litters usually average four to six pups (Fuller et al. 2003, USFWS et al. 2009). Average litter sizes of 5.3 (range 1-9) pups and 5.1 pups were reported from northwestern Montana in 1982-1994 (Pletscher et al. 1997) and from central Idaho in 1996-1998 (Mack and Laudon 1998), respectively. Litter size averaged at least 3.5-4.5 pups in Idaho from 2005 to 2010 (USFWS et al. 2006-2011).

Most packs produce only one litter annually, but occasionally more than one female in a pack may breed, resulting in multiple litters (Fuller et al. 2003). This phenomenon has been documented in

Yellowstone National Park, where for example 13 packs had 16 litters in 2000 (USFWS et al. 2001). In most cases, non-dominant females breed with males from other packs (Smith and Ferguson 2005). Presence of more than one litter can occasionally lead to the formation of new packs (Boyd et al. 1995). VonHoldt et al. (2008) documented an average generation time (i.e., average age at which females give birth to their offspring) of 4.16 years among wolves at Yellowstone National Park.

Pup survival is highly variable and is largely influenced by disease, predation, and nutrition (Johnson et al. 1994, Fuller et al. 2003, Mech et al. 2008). In northwestern Montana, wolf pup survival from mid-summer to December averaged 85% (range 60 to 100%) over a 12-year period (Pletscher et al. 1997). In the northern Rocky Mountain states from 1982 to 2004, annual pup survival was lower in northwestern Montana (40%) than in central Idaho (89%) and the greater Yellowstone area (76%) (Smith et al. 2010). In Yellowstone National Park, pup survival varied between 73 and 81% from 1996 to 1998, declined to 45% in 1999 because of a likely outbreak of canine distemper, and rebounded to 77% the following year (Smith et al. 2000, Smith and Almberg 2007). Pup survival again dipped to low levels in 2005 (32%) and 2008 (29%) due to canine distemper (Smith et al. 2006, Smith et al. 2009). Wolf pup survival from birth to midwinter averaged 29% (range 14 to 58%) in Wisconsin over a 28-year period (Wydeven et al. 2009a). In this population, lowest pup survival occurred in years coincident with an outbreak of parvovirus (Wydeven et al. 1995).

Pack size is another important factor in determining whether or not a pack is successful in breeding and raising pups. Recent analyses by Mitchell et al. (2008) reveal that larger packs of 10 or more wolves in Idaho, Montana, and Wyoming have a 90% or greater chance of successfully rearing two or more pups through December of a given year, whereas smaller packs are much less likely to do so. For example, depending on location within these states, packs of 4-5 animals had only a 20-73% chance of successfully raising at least two pups to year's end. Reduced reproductive output in wolf populations can therefore result as a consequence of high levels of human-caused mortality leading to smaller pack sizes (Brainerd et al. 2008, Mitchell et al. 2008).

### Food Habits

Gray wolves are opportunistic carnivores that are keenly adapted to hunt large prey species, such as deer, elk, and moose. Ungulate species comprise different proportions of wolf diets, depending on their relative abundance and distribution within territories. In the central and northern Rocky Mountains of the United States and Canada, elk are often the primary prey of wolves, but deer and moose are more important in some areas (Table 2). In coastal Alaska and British Columbia, black-tailed deer are the major prey (Darimont et al. 2004, 2009, Person et al. 1996). Moose are the major prey in much of British Columbia, including southern areas (G. Mowat, pers. comm.).

Wolves also prey on smaller animals, scavenge carrion, and even eat fish and vegetation. In addition to ungulates, wolf scat collected in Yellowstone National Park in 1998 contained the remains of voles, ground squirrels, snowshoe hares, coyotes, bears, insects, and plant matter (Smith 1998). Research in northwestern Montana has also documented non-ungulate prey such as tree squirrels, other small mammals, ruffed grouse, ravens, striped skunks, beavers, coyotes, porcupines, and golden eagles (Boyd et al. 1994, Arjo et al. 2002). In coastal Alaska and British Columbia, wolves include salmon and marine mammals in their diet (Person et al. 1996, Darimont et al. 2003, 2008,

Table 2. Prey selection by wolves at various locations in the central and northern Rocky Mountains of the United States and Canada and other areas of British Columbia.

Location	Season <sup>2</sup>	Prey species (% of diet <sup>1</sup> )								Source <sup>4</sup>
		Elk	White-tailed deer	Mule deer	Black-tailed deer	Moose	Bison	Bighorn sheep	Other <sup>3</sup>	
Glacier Natl Park	w	30	60	3	-	7	-	-	-	1
Glacier Natl Park area (Camas pack)	w	14	83	-	-	3	-	-	-	2
Glacier Natl Park area (Spruce pack)	w	35	4	-	-	61	-	-	-	2
Northwest Montana	y	23	49 <sup>5</sup>	-	-	12	-	-	15	3
Madison Range, sw Montana	w, sp	70	26	4	-	-	-	-	-	4
Idaho	su	53	42 <sup>5</sup>	- <sup>5</sup>	-	-	-	-	5	5
Salmon River Mtns, Idaho	w	77	-	23	-	-	-	-	-	6
Yellowstone Natl Park	w	92	2 <sup>5</sup>	- <sup>5</sup>	-	3	3	-	-	7
Yellowstone Natl Park	y	83	3 <sup>5</sup>	- <sup>5</sup>	-	<1	5	<1	7	8
Banff Natl Park	w, su	78	7 <sup>5</sup>	- <sup>5</sup>	-	10	-	2	3	9
N. Columbia Mtns, se British Columbia	sp, su, f	-	3 <sup>5</sup>	- <sup>5</sup>	-	95	-	-	2	10
Vancouver Island	y	28	-	-	71	-	-	-	1	11
Vancouver Island	w, su	38	-	-	56	-	-	-	7	12
Central coastal British Columbia	sp, su, f	-	-	-	70	-	-	-	30	13

<sup>1</sup> Results reported as percent of total kills, frequency of occurrence in feces, or frequency of occurrence based on stable isotope analysis of hair.

<sup>2</sup> Season: w, winter; y, year-round; sp, spring; su, summer; f, fall.

<sup>3</sup> Includes other wildlife, such as mountain goats, beaver, pronghorn, mountain caribou, smaller mammals, birds, and unknown species. For central coastal British Columbia, salmon and harbor seals comprised 10% and 6% of the diet, respectively, during the non-winter seasons combined (Darimont et al. 2008).

<sup>4</sup> Source: 1, Boyd et al. (1994); 2, Kunkel et al. (2004); 3, Arjo et al. (2002); 4, Atwood et al. (2007); 5, Mack and Laudon (1998); 6, Husseman et al. (2003); 7, Smith et al. (2004); 8, USFWS et al. (2007, 2008, 2009, 2010; results presented as the mean of these studies); 9, Huggard (1993); 10, Stotyn (2008); 11, Scott and Shackleton (1980); 12, Milne et al. (1989); 13, Darimont et al. (2008).

<sup>5</sup> Use of white-tailed deer and mule deer combined.

Watts et al. 2010), with greater use of these prey groups on islands compared to mainland sites (Darimont et al. 2009).

Wolves scavenge opportunistically on vehicle- and train-killed ungulates, winterkills, and on kills made by other carnivores, particularly cougars. Wolves in northwestern Montana scavenge the butchered remains of domestic livestock at rural bone yards and big game animals at carcass disposal sites. Wolves also kill and feed on domestic livestock such as cattle, sheep, llamas, horses, and goats.

### Territories

A pack establishes an annual home range or territory and defends it from trespassing wolves. From mid-April to early May until September or early October, pack activity is centered at or near the den or rendezvous sites, as adults hunt and bring food back to the pups. Rendezvous sites are specific resting and gathering areas that are used by wolf packs after pups emerge from the den. These sites

are often in wet meadows (Ausband et al. 2010) or forest openings near the den, but sometimes are several miles away. Adults will carry small pups to a rendezvous site. Breeding females make regular use of den or rendezvous sites, whereas use by nonbreeders in the pack is more variable (Demma and Mech 2009). By September, pups travel and hunt with the pack. The pack hunts throughout its territory until the following spring.

Wolves use different areas of their territory daily, which suggests rotational use that may improve hunting success (Demma and Mech 2009), and territory boundaries and sizes may vary from year to year. Similarly, a wolf pack may travel in its territory differently from one year to the next because of changes in prey availability or distribution, conflicts with neighboring packs, or the establishment of a new neighboring pack. Other attributes such as elevation, land use, land ownership patterns, prey species present, and relative prey abundance make each pack's territory unique. Rich (2010) reported that territory size in general increases with greater terrain ruggedness (which tends to reduce prey availability and vulnerability), higher human densities, and higher levels of lethal control, but decreases with larger numbers of neighboring packs.

During the mid- to late 1980s, the earliest colonizing wolf packs in northwestern Montana had territories averaging 382 square miles in size (Ream et al. 1991). Average territory size in this region fell to 185 square miles (range = 24-614 square miles) by the late 1990s (USFWS et al. 2000), probably as new territories filled in suitable unoccupied habitat. In western Montana, territory size currently averages about 230 square miles per pack (Rich 2010) but can reach 300 square miles or larger (USFWS et al. 2011). In 1999, Idaho wolf packs had average territory sizes of 360 square miles, with individual pack territories ranging from 141 to 703 square miles (USFWS et al. 2000). In Washington, territory sizes for two radio-tracked packs averaged about 350 square miles.

### Habitat Use

As with other aspects of their ecology, wolves are generalists in their habitat use. Within their historical geographic distribution, wolves occurred in every habitat with large ungulates, including forests, deserts, prairies, swamps, tundra, and coasts (Fuller et al. 2003). Elevations ranging from sea level to mountains were occupied. Wolves are adaptable enough that they will also enter and forage in towns and farms, cross highways and open environments, and den near sites heavily disturbed by people such as logging sites and military firing ranges (Fuller et al. 2003). Surviving wolf populations in much of western North America, including the northern Rocky Mountain states and British Columbia, predominantly inhabit forests and nearby open habitats, with prey availability and extent of human tolerance strongly influencing occupancy.

Wolves in the northern Rocky Mountain states have demonstrated a greater tolerance of human presence and disturbance than previously thought characteristic of the species. It previously was believed that higher elevation public lands would comprise the primary occupied habitats (Fritts et al. 1994), but most wolves in this region prefer lower elevations and gentle terrain where prey are more abundant, particularly in winter (Boyd-Heger 1997, USFWS 2007a).

The majority (77-93%) of habitat used to date by two packs in Washington has been on public land (federal and state), primarily U.S. Forest Service. Use of public and private land by wolves has differed in Montana and Idaho. Of the 94 documented packs in Idaho that survived during 2009, nearly all territories were wholly or predominantly on U.S. Forest Service (USFS) lands (USFWS et

al. 2011). In contrast, most packs in Montana exist on lands with a diversity of property owners and uses. These packs move through a complex matrix of public, private, and corporate-owned lands, with the average territory in northwestern Montana comprised of about 30% private land (USFWS et al. 2011).

Landowner acceptance of wolf presence and use of private lands is highly variable in space and time. Given the mobility of the species and the extent to which these lands are intermingled, it is not unusual for wolves to traverse each of these ownerships in a single day. Land uses range from dispersed outdoor recreation, timber production, or livestock grazing to home sites within the rural-wildland interface, hobby farming/livestock, or full-scale resort developments with golf courses.

Private lands may offer habitat features that are attractive to wolves, so some packs may use those lands disproportionately more than other parts of their territories. In some settings, geography dictates that wolf packs use or travel through private lands and co-exist in close proximity with people and livestock. Land uses may predispose a pack to conflict with people or livestock, although the presence of livestock does not make it a foregone conclusion that a pack will routinely depredate (Bangs and Shivik 2001, Sime et al. 2007).

### Dispersal

Upon reaching sexual maturity, most wolves leave their natal pack, looking for a mate to start a new pack of their own (Mech and Boitani 2003a, Treves et al. 2009). Dispersal may be to unoccupied habitat near their natal pack's territory or it may entail traveling much longer distances before locating vacant habitat, a mate, or joining another pack. Wolves appear to disperse preferentially to areas occupied by other wolves, using scent marking and howling to locate other animals (Ray et al. 1991). Boyd and Pletscher (1999) indicated that dispersers in their study moved toward areas with higher wolf densities than found in their natal areas.

In northwestern Montana from 1985 to 1997, 53% of tagged wolves (30 of 58) dispersed from their natal territories to establish new territories or join other existing packs; 59% of males (10 of 17) and 49% of females (20 of 41) dispersed (Boyd and Pletscher 1999). Males dispersed at an average age of 28.7 months and traveled an average of 70 miles, whereas females averaged 38.4 months old at dispersal and moved an average of 48 miles. Males and females combined traveled an average of 60 miles (range 10-158 miles), with 17% of dispersing individuals moving more than 100 miles. At Yellowstone National Park from 1995 to 1999, dispersal distances averaged 54 miles in males and 40 miles in females (Smith et al. 2000). Dispersals can occur in any month, but are somewhat more frequent in January-February (courtship and breeding season) and May-June (Boyd and Pletscher 1999). Maximum dispersal distances of more than 680 miles have been recorded (USFWS et al. 2011). Wolves are capable of traveling such distances over periods of a few weeks or months. Dispersing individuals typically have lower survival rates than non-dispersing wolves (Pletscher et al. 1997).

Dispersal has been regularly documented among and between populations in Montana, Idaho, Wyoming, and bordering areas of British Columbia, thereby increasing genetic exchange across the region (Bangs et al. 1998, Mack and Laudon 1998, Smith et al. 2000). Dispersal paths crossed international boundaries, state boundaries, public and private land boundaries, different land uses, and agency jurisdictions.

## Mortality

Few wolves in the wild live more than 4-5 years (Fuller et al. 2003), although maximum age can reach 15 years (Ausband et al. 2009a). Wolves die from a variety of causes, which are usually classified as either natural or human-caused. Natural deaths result from territorial conflicts between packs, injuries while hunting prey, old age, disease, starvation, or accidents. In populations protected from human-caused mortality, most wolves die from being killed by other wolves usually belonging to neighboring packs, disease, or starvation (Mech et al. 1998, Peterson et al. 1998, USFWS et al. 2011). However, natural mortality probably does not regulate most populations in Idaho, Montana, and Wyoming. Humans are the largest cause of wolf mortality in this region as a whole and are the only cause that can significantly affect populations at recovery levels (USFWS 2000, Mitchell et al. 2008, Murray et al. 2010, Smith et al. 2010). Mitchell et al. (2008) reported that humans were responsible for 71-87% of wolf deaths in five of six regions of Idaho, Montana, and Wyoming from 1979 through 2005, whereas only 23% of mortalities in Yellowstone National Park were human-related. Human-caused mortality includes control actions to resolve conflicts, illegal killings, legal harvest, and car and train collisions.

Annual survival rates averaged 75% among wolves in Idaho, Montana, and Wyoming during 1982-2004 (Smith et al. 2010). Prior to the legal hunting seasons in 2009-2010, on average, an estimated 10% of the wolves in these states died annually from control actions, 10% from illegal killing, 3% from human-related accidents, and 3% from natural causes (USFWS 2009). In 2010, human-caused mortality removed 179 wolves in Montana (24% of the state's wolf population), 142 (17%) in Idaho, and 56 (13%) in Wyoming (USFWS et al. 2011). Mortality is higher among younger wolves, dispersers, members of small packs, and wolves occurring in regions with reduced amounts of public lands (Smith et al. 2010).

Wolves are susceptible to a number of viral and bacterial diseases, including rabies, canine parvovirus, canine distemper, canine adenovirus (canine hepatitis), canine herpesvirus, and leptospirosis (Kreeger 2003, USFWS et al. 2007, Mech et al. 2008, Almberg et al. 2009, ODFW 2010). None of these appear to threaten the long-term population viability of wolves in the northern Rocky Mountain states, although periodic outbreaks of canine distemper have been linked to poor pup survival and population decline in some years (USFWS et al. 2007, 2010, 2011, Almberg et al. 2009). Wolves at Yellowstone National Park have shown high and relatively constant levels of exposure to canine parvovirus and canine adenovirus since their reintroduction in 1995, but each disease has produced little or no wolf mortality (Almberg et al. 2009). Canine parvovirus is suspected to have caused a decline in the wolf population at Isle Royale National Park, Michigan (Kreeger 2003), and in Wisconsin during the early 1980s when its wolf population was <30 animals (Wydeven et al. 1995). In Minnesota, canine parvovirus limited population growth and expansion of the wolf population through reductions in pup survival (Mech et al. 2008). Rabies may limit population growth in some situations (Kreeger 2003).

Wolves host various parasites, but most produce little pathology and do not regulate populations (ODFW 2010). Sarcoptic mange has been documented in wolves in Montana and Wyoming, but not Idaho (Jimenez et al. 2010). Occurrence of this disease increased noticeably among wolves at Yellowstone National Park in 2008 and 2009 (USFWS et al. 2009, 2010). Mange outbreaks can be locally severe and persistent in wolves, and commonly can result in mortalities, but are not considered a serious threat to population persistence (USFWS et al. 2006, 2009, Jimenez et al.

2010a). Dog lice have been recorded on wolves in the northern Rocky Mountain states and are perhaps a minor source of mortality in cases of severe infestation (Jimenez et al. 2010b). Wolves in the northern Rocky Mountain states have recently been identified as carriers of the tapeworm *Echinococcus granulosus* (see Chapter 7, Section F; Foreyt et al. 2009) and the protozoan *Neospora caninum* (Almberg et al. 2009).

### Rates of Population Change

In the absence of human-caused mortality, wolf populations primarily increase or decrease through the combination and interaction of wolf densities and prey densities (Keith 1983, Fuller 1989), although other factors (e.g., disease) may sometimes play a role. Actual rates of change depend on whether the wolf population is pioneering vacant habitat or whether the population is well established. Degree and type of legal protection, agency control actions, and regulated harvest also influence population trends. At higher densities, wolf populations are considered self regulated (i.e., abundance is density dependent) and possibly limited through territoriality or social strife rather than by prey biomass (Cariappa et al. 2011).

Once established, wolf populations can withstand high mortality rates provided that reproductive rates are also high and immigration continues (Fuller et al. 2003). Previous research suggests that mortality rates of about 30-50% should be sustainable and that human-caused mortality is largely compensatory (Mech 2001, Fuller et al. 2003, Adams et al. 2008). However, a study that modeled population growth as a function of human harvest for northern Rocky Mountain (NRM) wolves and other populations found that the maximum human offtake for stable or increasing wolf populations was 22% for NRM wolves and 24% for other wolf populations (Creel and Rotella 2010). These estimates were consistent with observed declines in NRM wolves when human harvests were 23-24%. Creel and Rotella (2010) also reported that human-caused mortality was not compensatory but highly additive. This is supported by the findings of Murray et al. (2010) and Adams et al. (2008).

Low-density wolf populations can increase rapidly if protected and prey is abundant. Wolf populations in the greater Yellowstone area and Idaho areas exceeded all expectations for reproduction and survival after their initial reintroductions (Bangs et al. 1998). Populations became reestablished in both areas within two years, rather than the predicted three to five years, and pup production and survival were high. However, once densities become high enough, social interactions among packs intensify, causing intraspecific conflict and increased competition for food. These factors eventually cause populations to level off or decline (Keith 1983, Fuller 1989).

Wolf populations in six regions of Idaho, Montana, and Wyoming increased at mean annual rates of 16-56% through 2005 (Mitchell et al. 2008). Some of the packs that formed in this region persisted, but others did not due to illegal killing, control actions where livestock depredation was repeated, and unknown reasons. Total wolf numbers in Montana increased from 8 to 497 wolves during the 26-year period from 1982 to 2008 before Montana's first wolf hunting season (USFWS et al. 2009) for an average annual rate of increase of about 17%. The population remained fairly small (fewer than 20) until 1989, then began a period of rapid increase that continued through 2008 when numbers grew in 13 of 19 years. Prey abundance has influenced wolf population dynamics in northwestern Montana. Expanding white-tailed deer populations during the late 1970s through the mid-1990s were partly responsible for increasing wolf numbers and distribution. However, the wolf population there declined after the severe winter of 1996-1997, when smaller prey populations

1 resulted in greater predation on livestock in 1997 and 1998, forcing an increase in the lethal control  
2 of wolves (C. Sime, unpubl. data).

3  
4 Idaho's wolf population grew from fewer than 20 animals in 1995, when reintroductions first  
5 occurred, to an estimated 856 wolves in 2008 (USFWS et al. 2009), which corresponds to a mean  
6 annual growth rate of about 33%. Eighty-eight packs were documented in 2008 and had expanded  
7 across much of the state from the Canadian border, south to the fringes of the Snake River plain,  
8 and east to the Montana and Wyoming borders. Wolf numbers declined substantially from 843 in  
9 2009 to 705 in 2010 due in large part to the state's first wolf hunt and continuing lethal control  
10 (USFWS et al. 2011).

11  
12 The population at Yellowstone National Park quickly expanded from no wolves at the time of  
13 reintroduction in 1995 to a peak of 174 wolves in 2003, then fell 31% to 118 animals in 2005  
14 (USFWS et al. 2006). Numbers grew 45% to 171 wolves in 2007 (USFWS et al. 2008), but then  
15 decreased by about 60% to 97 wolves in 2010 (USFWS et al. 2011). The declines in 2008 and 2009  
16 likely resulted from food stress, intraspecific stress, and disease (USFWS et al. 2010, 2011).

17  
18 Wolf populations in the Great Lakes region have experienced variable growth rates. Annual  
19 population growth rate in the 1990s was 37.4% in Michigan, 22.1% in Wisconsin, and 4.6% in  
20 Minnesota with slowing growth in the 2000s to 12.3%, 11.1%, and 3.6%, respectively (Wydeven et  
21 al. 2009b). Slowing growth rates suggest that wolves were beginning to saturate most areas of  
22 suitable habitat.

## 23 24 Role in Ecosystems

### 25 26 *Trophic Cascades*

27  
28 The wolf is a top-level or apex predator in the ecosystems in which it occurs, where it has few, if any  
29 significant competitors or predators. Some ecosystems may have more than one apex predator,  
30 such as wolves and grizzly bears in the greater Yellowstone ecosystem. Despite the generally small  
31 number of apex predator species, they typically influence the abundance and behavior of  
32 subordinate predator species, referred to as mesopredators (Soulé et al. 1988, Prugh et al. 2009).  
33 Coyotes, raccoons, and foxes are common examples of mesopredators. In the absence of an apex  
34 predator, the role of mesopredators can change as they become more abundant, select different  
35 prey, or take over the functional status of apex predator, a phenomenon known as mesopredator  
36 release. Conversely, the return or colonization of an apex predator to an ecosystem can result in  
37 mesopredator suppression, in which the apex predator directly or indirectly reduces the abundance  
38 or affects the ecology of mesopredators through predation, behavioral avoidance of the predator, or  
39 other interactions.

40  
41 Alteration of predator-prey dynamics can produce significant changes across the trophic levels in a  
42 food web, which are referred to as a trophic cascade (Hairston et al. 1960, Beschta and Ripple 2009).  
43 One example of a trophic cascade caused by the removal of an apex predator is that the behavior or  
44 abundance of mesopredators is no longer constrained, which in turn changes the behavior or  
45 abundance of herbivores, resulting in further changes in the abundance of the plants eaten by the  
46 herbivores (Rosenheim 2004). Alternatively, removal of an apex predator can directly impact its  
47 herbivore prey, which may then affect the food plants of these species. In both examples, the

1 trophic cascade can extend to many other plants and animals living in the ecosystem. The existence  
2 of trophic cascades has been well documented in many ecosystems, including terrestrial and marine  
3 systems (e.g., Estes and Duggins, 1995, Anthony et al. 2008).

#### 4 5 *Ecosystem Responses to Wolf Presence* 6

7 As indicated above, wolves can affect many species in an ecosystem through predation, trophic  
8 cascades, and other processes. These impacts include: (1) limitation of herbivore prey abundance  
9 and changes in prey behavior, (2) removal of inferior prey individuals and stimulation of prey  
10 productivity, (3) increasing food availability for scavengers and small carnivores, and (4)  
11 enhancement or limitation of some non-prey abundance (Mech and Boitani 2003b). However, the  
12 ecological affects of wolf predation on food webs are complex and interact with other biotic and  
13 abiotic factors, especially at lower trophic levels, and therefore generally remain poorly understood  
14 and difficult to predict (Berger and Smith 2005, Hebblewhite and Smith 2010).

15  
16 Regulation of large herbivore abundance and behavior by wolves can result in alterations to  
17 vegetation patterns (structure, succession, productivity, species composition, and species diversity),  
18 thereby potentially affecting many wildlife species residing in an ecosystem (Berger and Smith 2005).  
19 Research at Yellowstone and Banff national parks has linked wolf predation on elk and associated  
20 changes in elk density and behavior to the localized resurgence of woody browse species such as  
21 willows and aspen (Smith et al. 2003, Ripple and Beschta 2004, 2007, Beschta 2005, Beschta and  
22 Ripple 2010, Hebblewhite and Smith 2010). However, two recent studies dispute some of the  
23 reported findings from Yellowstone. Kauffman et al. (2010) stated that aspen are in fact not  
24 recovering in the park and that further reductions in elk abundance are needed for this to occur.  
25 Both Tercek et al. (2010) and Kauffman et al. (2010) found that abiotic factors such as soil moisture,  
26 soil mineral content, and snow depths were just as important in explaining the variable patterns in  
27 willow and aspen regrowth as elk browsing pressure. Hebblewhite and Smith (2010) concluded that  
28 only willow is recovering at Yellowstone due to reduced elk browsing.

29  
30 Willow resurgence at Yellowstone has allowed beaver numbers to increase and will probably result  
31 in greater amounts of foraging and nesting habitat for various birds and other species (Hebblewhite  
32 and Smith 2010). Tree and shrub recovery in riparian areas may also decrease stream temperatures  
33 and erosion, thereby potentially benefiting trout, salmon, and other fish. At Grand Teton National  
34 Park, Berger et al. (2001) hypothesized that overbrowsing of riparian zones by moose following the  
35 eradication of wolves and grizzly bears had produced changes in vegetation structure resulting in  
36 pronounced reductions or elimination of a number of neotropical migrant bird species (e.g., calliope  
37 hummingbird, willow flycatcher, gray catbird, yellow warbler, MacGillivray's warbler, fox sparrow,  
38 and black-headed grosbeak).

39  
40 Eradication of wolves has possibly produced a number of important ecological changes in Olympic  
41 National Park in northwestern Washington. Initial research by Beschta and Ripple (2008, 2009)  
42 suggests that overbrowsing by elk during the past century or so has caused substantial changes in  
43 riparian plant communities, including severe declines in the recruitment of black cottonwood and  
44 bigleaf maple. This in turn may have caused increased riverbank erosion and channel widening.  
45 Probable reductions in the amount of large woody debris in river channels during this period have  
46 likely reduced rearing habitat for salmon, steelhead, and resident fish. These changes in river  
47 ecology have probably also lowered the amount of aquatic invertebrate prey (including emerging

adult insects) available for fish, birds, and bats. Confirmation of these impacts is needed through additional research (P. Happe, pers. comm.).

Wolf-related reductions in coyote abundance may result in population changes among other medium-sized and small carnivores, either directly through reduced predation by coyotes or indirectly through adjustments in prey availability. For example, reduced interference competition with coyotes may increase the abundance of red foxes (Mech and Boitani 2003b). Similarly, wolf-related reductions in coyotes or exclusion of coyotes from certain areas may result in increased survival for some prey species consumed by coyotes (e.g., pronghorn; Berger et al. 2008, Berger and Conner 2008, Barnowe-Meyer et al. 2010).

It should be noted that most research on wolf-related trophic cascades has been conducted in national parks or other protected areas. It remains unclear whether the beneficial ecological impacts of wolves are as extensive in less pristine landscapes that have been influenced by livestock grazing or other human activities (L. D. Mech, pers. comm.). Climate and habitat productivity are other factors that also may affect the strength of ecological changes resulting from wolves (Rooney and Anderson 2009).

Removal of younger, older, and debilitated prey animals by wolves (Mech 1970, 2007, Kunkel et al. 1999, Mech and Peterson 2003, Smith et al. 2004) can leave prey herds comprised of a greater proportion of animals of prime age and in good health, which may in turn result in higher productivity in prey populations (Mech and Boitani 2003b). Preliminary evidence suggests that wolf predation can also change the occurrence of some diseases in prey populations, causing either reduced prevalence through the removal of infected individuals or increased prevalence where greater herding behavior enhances transmission (Wild et al. 2005, 2011, Barber-Meyer et al. 2007, Cross et al. 2010).

#### **D. Legal Status**

In Washington, gray wolves are subject to both the federal Endangered Species Act (ESA) and Washington state law (RCW 77.15.120, WAC 232-12-014; Appendix A). These laws are independent but somewhat parallel. As long as wolves remain federally listed in all or part of Washington, both federal and state law must be consulted to understand the protections that pertain to wolves in Washington.

##### Federal

Wolves were listed as endangered in 1973 under the federal ESA, which is intended to conserve and recover endangered and threatened species to levels where protection is no longer necessary. The ESA prohibits the take of endangered and threatened animals. The term “take” means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. Penalties for violations of the ESA include fines of up to \$100,000, with the maximum prison term of one year in jail.

In 1980, the U.S. Fish and Wildlife Service completed the Northern Rocky Mountain Wolf Recovery Plan, which was revised in 1987 (USFWS 1987). The plan specified a recovery criterion of 10 breeding pairs (defined as two adults of opposite sex capable of producing offspring) of wolves for

three or more consecutive years in each of three distinct recovery areas: (1) northwestern Montana, (2) central Idaho, and (3) the Yellowstone National Park area. The plan stated that if two recovery areas maintained 10 successful breeding pairs for three successive years, the population could be reclassified to threatened; and if all three recovery areas maintained 10 successful breeding pairs for three consecutive years, the wolf population could be considered fully recovered and considered for delisting. Washington is not included in this recovery plan.

This recovery goal was modified in 1994 to better meet the needs for reestablishing a wolf population with long-term viability. The goal now requires a total of 30 or more breeding pairs (defined as an adult male and adult female that raise at least 2 pups until December 31) comprising 300 or more wolves in a metapopulation (USFWS 1994). A metapopulation can be thought of as a group of partially isolated populations that interbreed and are able to recolonize sites of extirpated population. The goal also requires that at least 10 breeding pairs and 100 wolves be maintained per state (i.e., Idaho, Montana, and Wyoming) rather than per specified recovery area. As a safety margin against relisting, all three states have committed to managing for 15 breeding pairs and 150 wolves in mid-winter (E. Bangs, pers. comm.). The requirement for 10 breeding pairs and 100 wolves per state for three successive years was met in 2002.

Based on scientific reviews and updated information, the U.S. Fish and Wildlife Service began using entire states, in addition to recovery areas, to measure progress toward recovery goals. Wolves reintroduced into Yellowstone National Park and central Idaho in 1995 and 1996 were designated as “non-essential experimental populations” under the federal ESA within a combined zone covering all of Idaho south of Interstate 90, southwestern Montana, and all of Wyoming. Elsewhere (i.e., northwestern Montana and northernmost Idaho), wolves remained listed as endangered. In addition to population objectives in the three states, the U.S. Fish and Wildlife Service required approved state management plans to ensure the conservation of the species into the future as a condition of delisting the wolf in Idaho, Montana, and Wyoming. Washington was not required to have a state wolf conservation plan as a prerequisite for federal delisting because it was not part of the original Northern Rocky Mountain Wolf Recovery Plan (USFWS 1987). State wolf management plans were approved by the U.S. Fish and Wildlife Service for Montana and Idaho in 2004 and Wyoming in 2007.

In 2007, the U.S. Fish and Wildlife Service proposed the formation of a Northern Rocky Mountain distinct population segment (DPS) of the gray wolf and delisting of this DPS (USFWS 2007a). The proposed DPS encompassed all of Montana, Idaho, and Wyoming, as well as the eastern one-third of Washington and Oregon and a small part of north-central Utah (Figure 4), and became effective on March 28, 2008 (USFWS 2008a). Under this rule, wolves were federally delisted in Washington east of Highway 97 from the British Columbia border south to Monse, Highway 17 from Monse south to Mesa, and Highway 395 from Mesa south to the Oregon border, but remained federally listed west of these highways (Figure 4). However, the delisting rule was challenged in court; a preliminary injunction was granted in July 2008, which restored federal protection under the ESA. The rule was vacated by the judge at the request of the Service and was released in October 2008 for public comment (USFWS 2008b). On January 14, 2009, the U.S. Fish and Wildlife Service announced its intention to delist the DPS except in Wyoming, which no longer had an accepted management plan. The Service withdrew this action on January 20, 2009, pending further review, but announced its decision to proceed with delisting on March 6, 2009 (USFWS 2009). Delisting became effective on May 4, 2009, except in Wyoming.

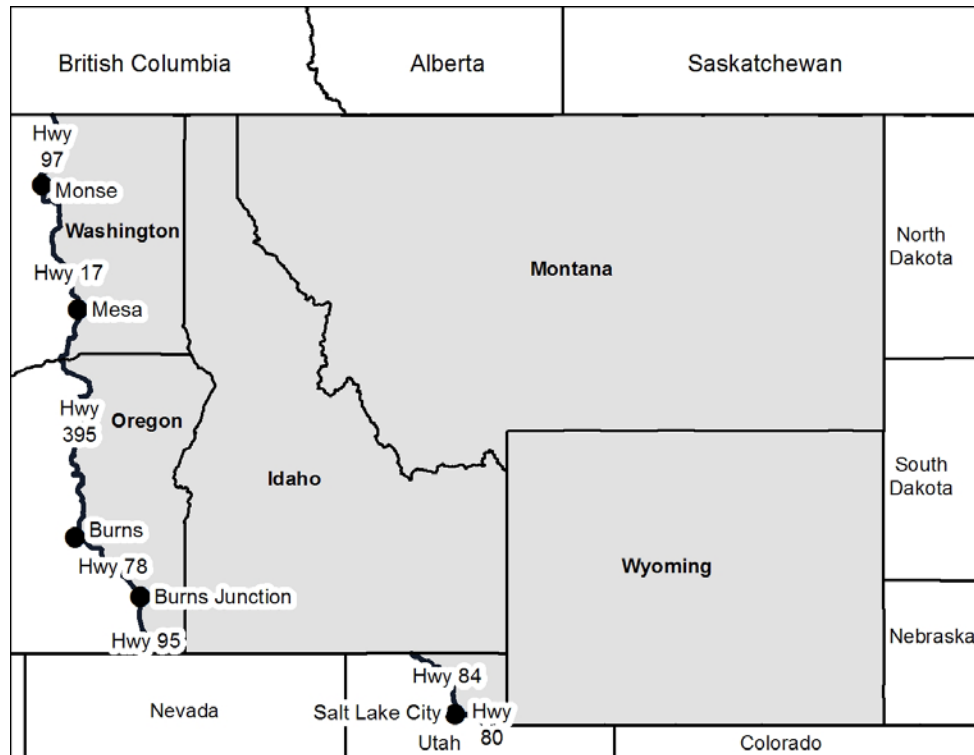


Figure 4. Map of the area (gray shading) designated by the U.S. Fish and Wildlife Service as the Northern Rocky Mountain distinct population segment of gray wolves.

In June 2009, two lawsuits were filed by conservation groups opposing delisting, while two others were filed by the state of Wyoming and a coalition of livestock groups and others seeking the delisting of wolves in that state. On August 5, 2010, a U.S. district judge vacated the U.S. Fish and Wildlife Service's 2009 delisting rule on the basis that the delisting of a portion of a DPS was not legal under the ESA. This reinstated the federal protections for wolves in the DPS that were in place prior to the 2009 delisting (USFWS 2010a).

On May 5, 2011, wolves in the Northern Rocky Mountain DPS, except Wyoming, were delisted as a result of a rider attached to the 2011 federal budget bill. Judicial review of the delisting was prohibited by the budget rider (USFWS 2011b). Following delisting, the U.S. Fish and Wildlife Service is required under the federal ESA to continue monitoring delisted populations for at least five years to ensure that abundance remains above a threshold for relisting.

Also on May 5, 2011, the U.S. Fish and Wildlife Service initiated a 5-year status review of wolves in the Pacific Northwest (USFWS 2011a). This will determine whether a separate DPS should be designated for wolves in western Washington, western Oregon, northern California, and western Nevada.

#### State of Washington

Wolves were first listed as endangered by the Washington Department of Game in 1980 because of their historical occurrence in the state and subsequent near-extirpation, and because of their existing

status as endangered under the federal Endangered Species Act. State law RCW 77.15.120 protects endangered species from hunting, possession, malicious harassment, and killing; and penalties for illegally killing a state endangered species range up to \$5,000 and/or one year in jail (Appendix F). State listing and delisting procedures for endangered, threatened, and sensitive species in Washington are specified in WAC 232-12-297 (Appendix A).

### Tribal

In the mid-1800s, eight treaties (known as the “Stevens Treaties”) were negotiated with tribes in what would become Washington State. The treaties established reservations for the exclusive use of the tribes. Federally recognized tribes with reservations generally have authority to manage fish and wildlife within their reservation. Not all of the state’s tribes signed treaties with the federal government. Several of these tribes have reservations designated by executive order. These include the Colville, Spokane, and Kalispel reservations in eastern Washington, and the Chehalis and Shoalwater reservations in western Washington.

### *Wolf Management*

Wolf management may vary among tribes in Washington. WDFW has established a Wolf Interagency Committee composed of WDFW, tribes, federal and state land managers, and the U.S. Fish and Wildlife Service to foster coordination and collaboration on wolf management in the state. Individual tribes in Washington may choose to develop their own wolf management plans, as several tribes in other states have done (Shoshone and Arapaho Tribal Fish and Game Department 2007, Blackfeet Tribal Business Council 2008, Confederated Salish and Kootenai Tribes Tribal Wildlife Management Program 2009). In areas where wolves are federally listed as endangered, tribes are subject to federal Endangered Species Act regulations. However, in areas of Washington where wolves become federally delisted, there is the potential for tribes to develop their own management plans and regulations regarding wolves. These may or may not be consistent with the state wolf plan. If issues were to arise over inconsistencies, they would be discussed in government-to-government consultations between WDFW and the tribes. With regard to hunting, treaties generally preempt state regulation of tribal treaty hunting. However, the courts have created a narrow exception to the general rule, which applies to situations where the state regulates the hunting of a particular species in order to conserve that species. Below is some additional detail describing off-reservation hunting rights in Washington.

### *Off-Reservation Hunting*

In addition to the authority to manage on reservation lands, the Stevens Treaty tribes reserved their rights to continue traditional activities on lands beyond these reserved areas. The treaties all contain substantially similar language reserving the right to hunt, fish, and conduct other traditional activities on lands off reservations. There are 24 tribes with off-reservation hunting rights in Washington. Two of the tribes, the Confederated Tribes of the Umatilla Indian Reservation and the Nez Perce Tribe, are located outside of the state, but have reserved hunting rights within Washington.

Tribal hunting rights for non-treaty tribes are typically limited to areas on the reservation, although the Colville Confederated Tribes’ hunting rights extend to an area that was formerly part of the

reservation known as the “North Half.” The Colvilles’ hunting rights to the North Half were upheld by the U.S. Supreme Court’s decision in *Antoine v. Washington* in 1975.

There are additional tribes that are recognized by the federal government, but have no specific off-reservation hunting rights. Members of those tribes are subject to state hunting regulations.

As federal law, treaties preempt inconsistent state law under the Supremacy Clause of the Federal Constitution. The courts have ruled that state regulation of tribal exercise of off-reservation hunting rights on open and unclaimed land is preempted by the Stevens Treaties, except where state regulation is necessary for conservation purposes.

The treaties do not expressly specify the geographical extent of the hunting right. In *State v. Buchanan* (1999), the Washington State Supreme Court ruled that this right extends to (1) the lands formally ceded by the tribes to the United States as those lands are described in the Treaties; and (2) may include other areas where it can be shown that those areas were “actually used for hunting and occupied [by the tribe] over an extended period of time.” The court did not provide a formal mechanism to evaluate and determine traditional hunting areas.

Federal and state courts have ruled that public land is “open and unclaimed” unless it is being put to a use that is inconsistent with tribal hunting. For example, in *U.S. v. Hicks*, a federal district court ruled that the Olympic National Park was not “open and unclaimed” because one of its purposes is the preservation of native wildlife and because hunting is generally prohibited in the park. In contrast, national forests have been held to be “open and unclaimed.” In *State v. Chambers* (1973), the Washington Supreme Court stated that private property is not “open and unclaimed,” but such private property must have outward indications of private ownership recognizable by a reasonable person.

## **E. Social, Cultural, and Economic Values**

Many aspects of the wolf-human relationship are based on long-held cultural perceptions. Modern viewpoints on wolves also illustrate the fundamental differences in the ways that urban and rural people view nature (Wicker 1996). As noted in the Montana Gray Wolf Conservation and Management Plan Draft EIS (MFWP 2003), “the differences in attitudes towards wolves might be summed up as the perceived chance of personal benefit or loss resulting from the presence of wolves. Those who feel they will benefit either directly or vicariously tend to favor wolf recovery and those who perceive the threat of personal loss oppose recovery.”

Decidedly negative views of wolves prevailed during the period of eradication in the United States and continue today among some portions of the population, especially those who may be economically impacted by wolf restoration (Wilmot and Clark 2005). Hunter groups also worry that wolves may reduce harvestable game populations. Additionally, some citizens view wolves as highly problematic in the greater context of preserving private property rights and achieving broader uses of public lands.

By contrast, many studies of human attitudes towards wolves in the United States have documented strong public support for wolves in recent decades, even in the West (Fritts et al. 2003). These attitudes are fostered by the fear of extinction and a desire to restore natural ecosystems to their

former function. Urban people and members of environmental organizations tend to hold the most positive and protectionist views toward wolves (Fritts et al. 2003). Favorable attitudes towards wolves also increase with geographic distance from occupied wolf range (Karlsson and Sjöström 2007). Wolf-related tourism has become an economic benefit in some areas, especially at Yellowstone National Park, where wolves are plentiful, easily located, and viewed from park roads (see Chapter 14, Section D). Nie (2002) cautioned that the debate over wolf recovery and management in the U.S. is a value-based political conflict that needs to go beyond economic or scientific framing. He suggested that an inclusive, participatory framework of multiple stakeholders holding diverse values may be a constructive way to address the socio-political dimensions of wolf recovery (Nie 2002).

### Views of Native Americans in Washington towards Wolves

Perspectives regarding wolves vary amongst Native American tribes in Washington. A number of tribes in the state have traditional and cultural ties with wolves; and there are also concerns in some tribes regarding potential impacts on opportunities for subsistence harvest of elk, deer, and moose.

There are several summaries on the strong cultural and spiritual ties of Native American tribes in Washington to wolves (Laufer and Jenkins 1989, Ratti et al. 1999). Wolves are respected for their intelligence, hunting ability, and devotion to other pack members (Ratti et al. 1999). These and other values have been taught to generations of Native Americans through the telling of stories and legends. Wolves play an important role in the creation stories and other legends of many tribes, such as the Quinault, Quileute, Makah, and S'Klallam of the Olympic Peninsula (see Ratti et al. 1999). Wolves also have significant parts in the spiritual life of some tribes. For example, they serve as spirit guides for tribal members and provide spiritual power to warriors and hunters (see Ratti et al. 1999). Wolves are also featured in vision-quest stories, rituals, and ceremonial practices. Thus, for many tribes, there is a general regard that wolves “help” humans to prosper both physically and socially (Laufer and Jenkins 1989).

Although some tribes had taboos against killing wolves (Laufer and Jenkins 1989), others such as the Salish and Quinault are known to have hunted them (Ratti et al. 1999). The Sanpoil and Nespelem of northeastern Washington caught wolves and used their skins for robes or blankets (Ray 1933). Wolves were also sometimes kept as pets.

### Survey Results of Public Attitudes in Washington

Four recent studies in Washington provide information on citizen attitudes statewide on a variety of questions pertaining to hunting and wildlife management, including wolves. The first of these (Duda et al. 2008a) was conducted by Responsive Management, a professional public opinion and attitude survey research firm specializing in natural resource and outdoor recreation issues. This study examined overall public opinion and entailed a telephone survey of 805 Washington residents 18 years old and older in January 2008. The survey asked six questions about wolves and related issues. Specific information on the survey and its findings can be found at <http://wdfw.wa.gov/publications/pub.php?id=00433>. The following summary of results is reprinted from the survey's final report:

- 1 • “The large majority of Washington residents (75%) support allowing wolves to recover in  
2 Washington; meanwhile, 17% oppose it.  
3
- 4 • “A cross tabulation found that those who live in urban and suburban areas are more likely to  
5 support wolf recovery; while those residing in small city/town or rural areas are more likely  
6 to oppose. Note that those living on ranches or farms are the most likely to *strongly* oppose.  
7
- 8 • “When the stipulation is put on wolf recovery that it could result in localized declines in elk  
9 and deer populations, support declines slightly: 61% support wolf recovery if it will result in  
10 some localized declines in elk and deer populations, and 28% oppose.  
11
- 12 • “Most Washington residents (61%) support some level of lethal wolf control to protect at-  
13 risk livestock; however, 31% oppose. Additionally, a majority of residents (56%) support  
14 having the state pay compensation out of the General Fund to ranchers who have  
15 documented losses to livestock from wolves, but 35% oppose.  
16
- 17 • “When asked how worried, while recreating outdoors, they would be about wolves,  
18 respondents most commonly say that they would not be worried at all (39%), and 26%  
19 would be only a little worried; in sum, 65% would be only a little worried or not worried at  
20 all. On the other hand, 33% would be very or moderately worried, with 11% *very* worried.  
21
- 22 • “In a question tangentially related to wolf management, the survey found that wildlife  
23 viewing specifically of wild wolves would appear to be popular, as 54% of residents say that  
24 they would travel to see or hear wild wolves in Washington. (Note that 2% of respondents  
25 say that they would not need to travel, as they have wild wolves nearby already.)”  
26

27 The second survey (Duda et al. 2008b), also conducted by Responsive Management, assessed hunter  
28 opinions and was conducted via telephone interviews with 931 Washington hunters 12 years old and  
29 older from December 2007 to February 2008. Interviewees in this study were exclusive from those  
30 contacted by Duda et al. (2008a). The survey asked three questions about wolves and related issues.  
31 Specific information on the survey and its findings can be found at  
32 <http://wdfw.wa.gov/publications/pub.php?id=00433>. The following summary of results is  
33 reprinted from the survey’s final report:  
34

- 35 • “After being informed that wolves are highly likely to re-colonize Washington over the next  
36 10 years, hunters were asked if they support or oppose having the Department manage  
37 wolves to be a self-sustaining population. Support exceeds opposition among every type of  
38 hunter except [those in a category combined for] sheep/moose/goat hunters.  
39
- 40 • “Common reasons for supporting include that the hunter likes wolves/that all wildlife  
41 deserves a chance to flourish, that wolves should be managed and controlled anyway, or that  
42 wolves should be managed so that they do not overpopulate.  
43
- 44 • “Common reasons for opposing include concerns about potential damage to livestock  
45 and/or game and wildlife, that the respondent does not want wolves in the area, or that  
46 wolves are not manageable.”

The third survey (Dietsch et al. 2011) was conducted by Colorado State University in collaboration with WDFW and examined overall public opinion on different wildlife management issues based on 4,183 mail-in responses from Washington residents in the fall of 2009. The survey asked eight questions about wolves and related issues. Specific information on the survey and its findings can be found at <http://wdfw.wa.gov/publications/pub.php?id=01190>. The following summary of results is reprinted from the survey's final report:

- “Washington residents generally found natural recolonization of the state by wolves to be acceptable (74.5%).
- “Residents also supported translocation of wolves by WDFW from one area in Washington where they have reached a certain population size to another area in the state to reestablish new wolf populations (73.7%).
- “There was also a high level of support among residents for wolf control measures. Specifically, residents were accepting of lethal removal of wolves that have caused loss of livestock (65.9%), limiting the number of wolves in certain areas if they are contributing to localized declines in deer or elk (69.8%), and a limited hunting season on wolves once they have exceeded WDFW recovery goals (63.5%).
- “Residents were less accepting of landowner compensation schemes for wolf-related livestock losses (44.8%), but were slightly more accepting of these strategies if the funds for compensation came from the sale of hunting and fishing licenses (46.1%) rather than from state tax dollars (40.3%).
- “Current hunters were highly supportive of limiting wolf numbers, both in terms of lethal removal of damage-causing animals and recreational hunting.....Non-hunters were significantly more supportive of wolf recolonization than were past or current hunters.”

The fourth survey (Callahan 2011) was conducted as part of a Master's thesis focused entirely on public opinion about wolves and wolf management in Washington. The survey asked Washington residents 51 questions pertaining to wolves in March 2009, with results based on 325 mail-in responses. The following summary of results comes from a preliminary report on the study's findings:

- More Washington residents are in favor of having wolves in Washington (48.3% strongly or somewhat approved) than opposed to having them (18.1% strongly or somewhat disapproved).
- Among respondents living in western Washington (i.e., west of the Cascade crest), most preferred a situation in which wolves become reestablished in many, most, or all western Washington counties (59.0%) vs. in no or few western Washington counties (38.8%). Among respondents living in eastern Washington (i.e., east of the Cascade crest), most preferred a situation in which wolves become reestablished in many, most, or all eastern Washington counties (68.4%) vs. in no or few eastern Washington counties (27.8%).

- 
- 1
  - 2 • Most Washington residents thought that conservation groups and ranchers should work
  - 3 together to develop proactive and non-lethal methods for managing wolves (55.7% strongly
  - 4 or somewhat favored this vs. 13.6% who strongly or somewhat opposed this).
  - 5
  - 6 • Most Washington residents thought that the threat of a wolf hurting or killing a person is so
  - 7 low that it should not be an important factor in determining the total number of wolves
  - 8 allowed to live in the state (52.0% strongly or somewhat favored this vs. 16.9% who strongly
  - 9 or somewhat opposed this).
  - 10
  - 11 • Most Washington residents thought that wolf populations provide ecological benefits
  - 12 (51.1% strongly or somewhat favored this vs. 15.7% who strongly or somewhat opposed
  - 13 this).
  - 14
  - 15 • More Washington residents thought that the most effective method for managing wolves is
  - 16 to educate the public about how to live with wolves (48.3% strongly or somewhat favored
  - 17 this vs. 19.4% who strongly or somewhat opposed this).
  - 18
  - 19 • More Washington residents thought that the state's wolf population should not be allowed
  - 20 to impact deer and elk numbers to the point that hunting of these species becomes more
  - 21 restricted (38.5% strongly or somewhat agreed with this vs. 25.2% who strongly or
  - 22 somewhat disagreed with this).
  - 23
  - 24 • Somewhat more Washington residents believed that wolves should be managed by hunting
  - 25 (36.9% strongly or somewhat favored this), as is done with cougars and bears, than not
  - 26 (29.2% strongly or somewhat opposed this).
  - 27
  - 28 • Somewhat more Washington residents opposed adjusting hunting limits to allow for more
  - 29 prey for wolves (32.3% strongly or somewhat opposed this) than supported this (25.2%
  - 30 strongly or somewhat favored this).
  - 31
  - 32 • Washington residents were split on whether wolves should be trapped and relocated to
  - 33 suitable regions of Washington where natural migration is difficult or impossible (31.4%
  - 34 strongly or somewhat favored this vs. 32.0% who strongly or somewhat opposed this).
  - 35
  - 36 • Most Washington residents favored using state tax funds to manage wolves for the following
  - 37 purposes: 1) to preserve wolves as a wildlife species (56.9% strongly or somewhat supported
  - 38 this vs. 15.1% who strongly or somewhat opposed this), 2) to keep wolves away from
  - 39 residential areas (54.1% strongly or somewhat supported this vs. 10.5% who strongly or
  - 40 somewhat opposed this), and 3) to encourage collaboration between conservation groups
  - 41 and ranchers to develop, use, and monitor proactive non-lethal wolf management tools
  - 42 (50.5% strongly or somewhat supported this vs. 17.2% who strongly or somewhat opposed
  - 43 this).
  - 44
  - 45 • Most Washington residents supported having private conservation organizations help fund
  - 46 implementation of the Wolf Conservation and Management Plan (56.3% of respondents)

1 strongly or somewhat supported this vs. 10.7% who strongly or somewhat opposed this).  
2 There was lower support or opposition for the use of fees or tax dollars from the following  
3 sources for this purpose: 1) increased hunting and fishing license fees (39.1% supported this  
4 vs. 30.5% who opposed it), 2) the federal government (36.4% supported this vs. 25.0% who  
5 opposed it), 3) a state wildlife tax (32.3% supported this vs. 33.8% who opposed it), and 4)  
6 Washington's general fund (27.4% supported this vs. 36.3% who opposed it).  
7

8 In addition to the four public attitude surveys, Mazur (2011) used a different type of methodology to  
9 provide structure to analyzing public attitudes and preferred management strategies for wolves in  
10 Washington. Thirty-two people representing a range of values about wolf recovery participated in  
11 the process. Mazur (2011) identified three dominant perspectives among the stakeholders: scientific,  
12 incompatibility, and precautionary perspectives. The scientific perspective promotes the use of best  
13 science, public education, and outreach to achieve ecosystem restoration. The incompatibility  
14 perspective holds that wolves do not have a place in Washington and urges that proactive measures  
15 be taken to mitigate ungulate decline and hunting traditions. The precautionary perspective cautions  
16 about impacts that wolves will have on livestock producers and urges fairness in management.  
17 Explicit areas of consensus and contention were identified. Mazur (2011) suggested these could be  
18 used to develop management approaches that are more likely to be acceptable across all stakeholder  
19 groups involved in wolf recovery in Washington.  
20

---

### 3. WOLF CONSERVATION

The conservation portion of this plan identifies the strategies to reestablish a naturally reproducing and viable population of gray wolves distributed in a significant portion of the species' former range in Washington. WAC 232-12-297 (Endangered, threatened and sensitive wildlife species classification; Appendix A) defines the process by which "listing, management, recovery, and delisting of a species can be achieved." The process requires the preparation of a recovery plan for species listed as endangered or threatened. At a minimum, recovery plans must include target population objectives, criteria for reclassification, and an implementation plan for reaching population objectives. The Washington Wolf Conservation and Management Plan is designed to meet the requirements under WAC 232-12-297 for a state gray wolf recovery plan.

This chapter of the plan provides:

- background on the scientific basis of conservation planning for wolves (Section A)
- recovery objectives for wolves in Washington (Section B)
- a discussion of wolf management after delisting (Section C)

#### A. Scientific Basis for Conservation Planning

State wildlife agencies have employed several approaches for setting recovery objectives for wolves that are intended to ensure long-term viability. WDNR (1999) determined that the objectives for Wisconsin had to achieve four standards. They needed to:

- meet or exceed federal recovery criteria,
- be compatible with existing information on wolf population viability analysis,
- represent a population level that could be supported by the available habitat, and
- be socially tolerated to avoid development of strong negative attitudes toward wolves.

These standards provide guidance for a scientific basis for setting wolf recovery objectives for Washington.

#### Consideration of Federal Recovery Objectives

When the states of Minnesota, Michigan, Wisconsin, Idaho, Montana, and Wyoming developed state wolf plans, they had to meet or exceed the federal population goals established by the U.S. Fish and Wildlife Service in federal recovery plans (USFWS 2009, Wydeven et al. 2009b). In the Great Lakes region, states established minimum population goals that were 100-200 wolves higher than the minimum federal goals; these goals were derived after conducting population viability analyses (Wydeven et al. 2009b).

In Washington and Oregon, there were no federal population objectives to consider in developing state objectives because the two states were not included in the Northern Rocky Mountain Wolf Recovery Plan (USFWS 1987). As a result, there are no minimum federal population objectives that must be met or exceeded in developing Washington's wolf recovery objectives.

## Population Viability

Recovery objectives for downlisting and delisting a species need to be set at sufficient numbers of individuals and levels of geographic distribution to ensure that a permanently viable population is reestablished. For the purposes of this document, a “viable” population is one that is able to sustain its size, distribution, and genetic variation in the long term without requiring human intervention and conservation actions. Such populations must also be able to withstand fluctuations in abundance and recruitment associated with variation in food supplies, predation, disease, and habitat quality. For wolves, long-term persistence of a population in Washington will depend on other factors as well, including proximity and connectivity (e.g., vonHoldt et al. 2008) to source populations (outside and potentially within the state), competing carnivore populations, the extent of conflicts with livestock production, and overall social tolerance by people.

### *Federal Population Viability Analyses for the Northern Rocky Mountain Wolf Recovery Plan*

The number of individuals needed to maintain the long-term viability of wolf populations is widely debated. In 1994, the U.S. Fish and Wildlife Service (2008a) concluded that 30 or more breeding pairs comprising 300 or more wolves in a metapopulation (a population made up of partially isolated sets of subpopulations that are able to exchange individuals and recolonize sites in which the species has recently become extirpated) should have a high probability of long-term persistence because:

“... such a population would contain enough individuals in successfully reproducing packs distributed over distinct but somewhat connected large areas to be viable for the long-term (USFWS 1994). A population at or above this size would contain at least 30 successfully reproducing packs and ample individuals to ensure long-term population viability. In addition, the metapopulation configuration and distribution throughout secure suitable habitat would ensure that each core recovery area would include a recovered population distributed over a large enough area to provide resilience to natural or human-caused events that may temporarily affect one core recovery area. No wolf population of this size and distribution has gone extinct in recent history unless it was deliberately eradicated by humans (Boitani 2003)” (USFWS 2008a).

In the mid-1990s, Fritts and Carbyn (1995) provided a synthesis of information for insight into minimum population size and area requirements for wolf conservation. They reviewed the scientific literature on minimum viable population size, examined case histories of wolf populations, and surveyed biologists familiar with wolves. They were skeptical of results from population viability analyses because they were based on insufficient theoretical models to account for the high resilience of small wolf populations. In their survey of biologists about whether recovery goals in the Northern Rocky Mountain Wolf Recovery Plan would equate to a viable wolf population, 61% of respondents believed that 10 breeding pairs (about 100 wolves) met the minimum standard of a viable population, whereas 70% agreed that three groups of 10 breeding pairs and 100 wolves in a metapopulation (about 300 wolves) for three consecutive years met the definition of viable (Fritts and Carbyn 1995). Based on this assessment, Fritts and Carbyn (1995) concluded that 100 or more wolves might be needed to maintain viability in isolation.

Haight et al. (1998) modeled the long-term population survival (50 years) of a hypothetical, isolated wolf population of about 100 wolves. In their analysis, the landscape was capable of supporting a maximum of 16 territories, representing a disjunct population of 96 wolves (6 wolves per pack). Different human-caused mortality rates were simulated in the model by varying the number of

territories in core (lower mortality rates) or peripheral (higher mortality rates) range. For a small initial population occupying 2 of the 16 territories, immigration was crucial in maintaining growth of the small population; with no immigration, mean territory occupancy in year 50 was less than 80% with fewer than 8 territories in core habitat. For a large initial population in which 14 of the 16 available territories were occupied, mean occupancy remained high at year 50 regardless of immigration, provided that pup and dispersal mortality were low and consistent with a legally protected population. For a large initial population, with higher pup and dispersal mortality, two or more immigrants per year were necessary to maintain high site occupancy ( $\geq 80\%$ ) provided that four or more territories were in core habitat. Adding environmental variation to the model to account for short-term prey fluctuations exacerbated the effect of little or no immigration on population persistence, especially when pup or dispersal mortality was high; under these scenarios populations were more likely to decline or go extinct. Results of these simulations and empirical evidence from isolated or semi-isolated wolf populations (Fritts and Carbyn 1995) indicate that disjunct populations of wolves may persist provided that adequate immigration is maintained, human-caused mortality is not excessive, and prey is abundant.

In 2001-2002, the U.S. Fish and Wildlife Service reevaluated recovery criteria for the Northern Rocky Mountain distinct population segment in an effort to update their 1994 analysis and conclusions of Fritts and Carbyn (1995). The assessment of the recovery goals included a review of the scientific literature and a survey of wolf experts on population viability. Most reviewers (78%) strongly supported the 1994 conclusion that a metapopulation of at least 30 breeding pairs and at least 300 wolves would provide a viable wolf population (USFWS 2008a). However, the experts also concluded that viability would be “enhanced by higher (500 or more wolves) rather than lower population levels (300) and longer (more than 3 years) rather than shorter (3 years) demonstrated time frames [because the] more numerous and widely distributed a species is, the higher its probability of population viability will be” (USFWS 2008a). Based on this reevaluation, the U.S. Fish and Wildlife Service retained its 1994 wolf recovery goals for the Northern Rocky Mountain distinct population segment (USFWS 2008a).

Recent studies that reviewed minimum viable population (MVP) size requirements for many species, including wolves (Reed et al. 2003, Brooks et al. 2006, Traill et al. 2007, 2010). Reed et al. (2003) estimated MVP for 102 vertebrate species and found the overall median estimate was 5,816 adults. Traill et al. (2007) conducted a meta-analysis of MVP for 212 species, including the gray wolf, and reported a median MVP of 4,160 individuals. Brook et al. (2006) estimated MVP for 1,198 species, including the gray wolf, and reported a median MVP of 1,377 individuals. These studies suggest that populations of several thousand individuals may be needed to ensure long-term persistence ( $>90\%$  probability for 100 years). Species with populations of several hundred individuals may only ensure 50% probability of persistence on a long-term time scale.

Flather et al. (2011) identified some shortcomings in the methods used in these studies, citing a lack of data and theory to support their general applicability. Using supplementary data from Traill et al. (2007), they demonstrated high variability in standardized MVPs within species, such as the wolf. In this case, MVP varied from 248 to 6,332 individuals and had a strong dependence on environmental context. Although Flather et al. (2011) discounted the applicability of a universal threshold for MVP, they supported using population viability analysis modeling based on data specific to the focal population at risk.

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*State Population Viability Analyses for Wisconsin and Michigan*

Both Wisconsin and Michigan conducted population viability analyses on an isolated population to provide a conservative estimate of wolf numbers needed for viability if exchange of wolves among the Great Lakes population declined in the future (WDNR 1999, Beyer et al. 2009). In Wisconsin, population viability analysis suggested that an isolated population of 300-500 wolves would have a high probability of persisting for 100 years under most of the scenarios tested (WDNR 1999). However, simulations employing moderate to high levels of environmental variation and catastrophic events resulted in substantially greater likelihood of extinction or the need to relist the population. Criteria for downlisting wolves in Wisconsin to state threatened status were set at 80 or more wolves for 3 years, with state delisting set at 250 or more wolves for 1 year (outside tribal reservations) (Wydeven et al. 2009a). In Michigan, population viability analysis suggested that 200 wolves “reasonably approximated a viable population” (Beyer et al. 2009:76).

Genetic Diversity and Gene Flow

An underlying tenet of endangered species recovery is that populations need to be functionally connected so that genetic material can be exchanged. In isolation, no population of wolves less than several thousand is expected to maintain its genetic viability (Fritts and Carbyn 1995, vonHoldt et al. 2008). Loss of genetic variation can pose a conservation threat to wolves by causing decreased reproductive rates, reduced disease resistance, and other problems. These can, in turn, hinder the long-term recovery of populations regardless of other factors such as habitat and prey availability. Inbreeding depression has been suggested as the cause of reproductive problems (e.g., reduced sperm quality, decreased litter size, reduced pup survival) and other problems (e.g., congenital backbone deformities) noted in several small wolf populations (Wayne and Vilà 2003, Liberg et al. 2005, Asa et al. 2007, Fredrickson et al. 2007, Räikkönen et al. 2009). Nevertheless, many existing wolf populations have persisted for decades or centuries with low genetic diversity (Fritts and Carbyn 1995, Boitani 2003). As a result, wolf populations are broadly considered to be more threatened by issues relating to excessive human-caused mortality than by genetic concerns (Boitani 2003).

Although wolves display several behaviors that help them avoid inbreeding (see Chapter 2, Section C), isolated populations that remain small in size can experience reductions in genetic diversity because members have few opportunities for mating with unrelated individuals. Wolf populations feature effective population sizes (i.e., the average number of individuals in a population that breed and successfully pass their genes to succeeding generations;  $N_e$ ) that are much smaller than the total size of populations ( $N$ ) (Aspi et al. 2006). This means that retaining adequate numbers of successfully breeding adults is particularly important in preserving the long-term genetic viability of wolf populations. Analyses by vonHoldt et al. (2008) suggested that isolated populations maintaining 10 breeding pairs and 100 wolves will lose genetic variation and become inbred over the long term. Bensch et al. (2006) reported that an isolated wolf population in Scandinavia that grew from a founding breeding pair and one subsequent immigrant to about 140 wolves during a 21-year period lost genetic diversity at a rate of 2% per generation (i.e., about every 4 years). Other small wolf populations also possess reduced levels of genetic variability (Peterson et al. 1998, Wayne and Vilà 2003, Fredrickson et al. 2007). Based on the genetic traits of wolves at Yellowstone National Park, vonHoldt et al. (2008) predicted that without immigration, inbreeding depression

would cause the park's population of about 170 animals to experience an increase in pup mortality from an average of 23 to 40% within 60 years.

To preserve the genetic diversity of isolated wolf populations, vonHoldt et al. (2008) suggested that conservation efforts should discourage actions that interfere with pack formation and retention. For example, intense control actions that result in the frequent removal of breeding pairs or severe disruption of pack stability may lead to high breeder turnover and the possibility of reduced genetic exchange through fewer mating choices with unrelated individuals. High levels of lethal removal associated with livestock depredation and hunting could also significantly reduce genetic connectivity and effective population size of wolves in a metapopulation (vonHoldt et al. 2010). Genetic concerns in wolf populations can be alleviated by management actions such as increased protection, restoration of habitat, and augmentation of populations through translocation (vonHoldt et al. 2008, Kojola et al. 2009, USFWS 2009). The addition of even a single breeding immigrant can dramatically increase the genetic variability of isolated populations (Vilà et al. 2003, Adams et al. 2011). Translocations reestablishing new populations should emphasize adequate numbers of founders so that these populations start with significant genetic diversity.

Current wolf populations in the northern Rocky Mountain states are characterized by high levels of genetic variability and substantial gene flow (Forbes and Boyd 1996, 1997, vonHoldt et al. 2008, 2010, Hebblewhite et al. 2010), meaning that wolves arriving in Washington from this source should be genetically healthy. In addition to wolves dispersing into Washington from the Rocky Mountain states, the genetic makeup of wolves in the state would be further diversified by breeding with wolves dispersing into the state from British Columbia.

#### Potential Suitable Habitat and Biological Carrying Capacity

##### *Potential Suitable Habitat in Washington*

As a habitat generalist, wolves are capable of living in a variety of ecosystems having adequate prey and sufficient human tolerance. Oakleaf et al. (2006) looked at potential wolf habitat in Idaho, Montana, and Wyoming, using the following GIS data layers: roads accessible to two-wheel and four-wheel vehicles, topography (slope and elevation), land ownership, relative ungulate density (based on State harvest statistics), cattle and sheep density, vegetation characteristics, and human density. From that analysis, they concluded, and the U.S. Fish and Wildlife Service (USFWS 2008a) concurred, that the four primary factors related to wolf occupancy and persistence were: 1) forest cover, 2) human population density, 3) elk density, and 4) domestic sheep density. Higher forest cover and elk density increased the probability of occupancy and persistence, whereas higher human and sheep densities decreased the probability of occupancy and persistence.

Wolves are expected to persist in habitats with similar characteristics in Washington. Areas with abundant deer, elk, and moose, lower livestock use, and few potential human conflicts offer the best chance for recovery success. These locations include national forests, national parks, wilderness areas, national recreation areas, designated roadless areas on public lands, and areas with low densities of open roads. In some areas, wolves are expected to follow their prey to lower elevations during the winter.

Historically, wolf distribution in Washington included much of the state. During the 70 or so years that wolves have been essentially absent from Washington, humans have significantly altered the landscape. Habitat once occupied by wolves has been reduced by development and land conversion, with many suitable areas now existing as fragments rather than as large contiguous blocks. Road densities have increased dramatically and the human population has grown to more than six million people. Although these changes have reduced the amount of habitat now available to wolves, large areas of Washington still have low human densities and are potentially suitable for the species.

There have been five recent modeling studies that have estimated potentially suitable wolf habitat in Washington. They vary in approach, data layers that were used, and in predictions of amounts of potentially suitable wolf habitat in the state, but most were consistent in predicting suitable habitat in northeastern Washington, the Blue Mountains, the Cascade Mountains, and the Olympic Peninsula (Figures 5-8). The five studies include:

(1) B. Maletzke (unpubl. data) used the four parameters (i.e., elk density, forest cover, human density, and presence of sheep allotments) found by Oakleaf et al. (2006) to be the most important predictors of wolf occupancy and persistence in Montana, Idaho and Wyoming. Methods for calculating these parameters appear in the methods section of Appendix G. Maletzke determined that nearly all potentially suitable wolf habitat ( $\geq 50\%$  probability of occupancy) occurs in northeastern Washington, the Blue Mountains, the Cascade Mountains, southwestern Washington, and the Olympic Peninsula (Figure 5).

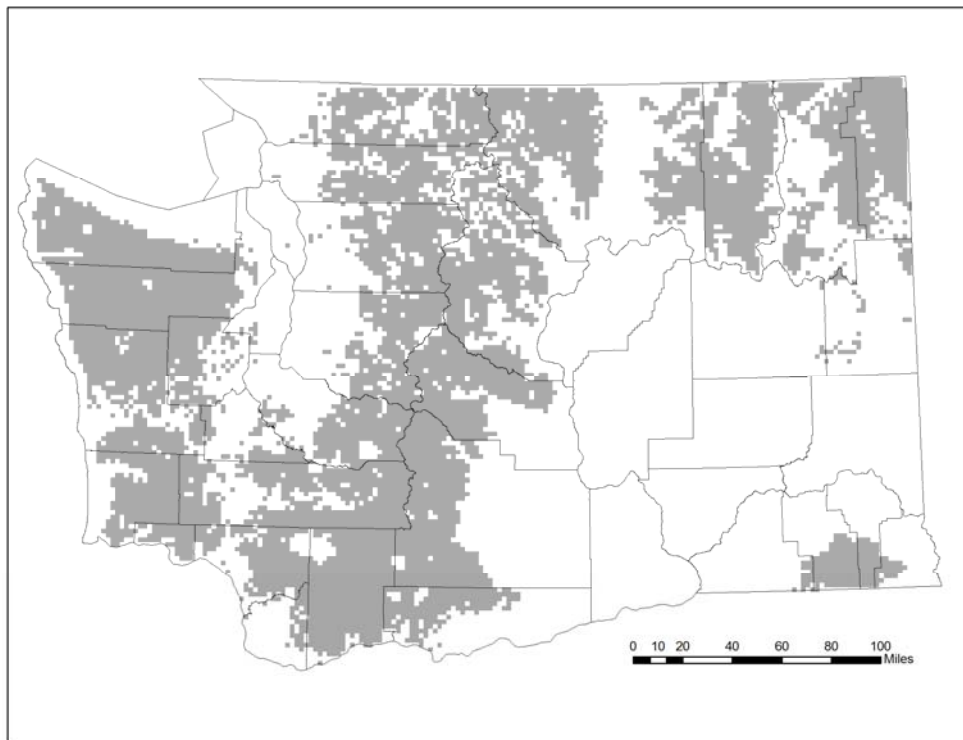


Figure 5. Estimated suitable wolf habitat likely ( $\geq 50\%$  probability) to be occupied in Washington (gray shading), using the parameters of Oakleaf et al. (2006). Analyses were conducted by B. Maletzke.

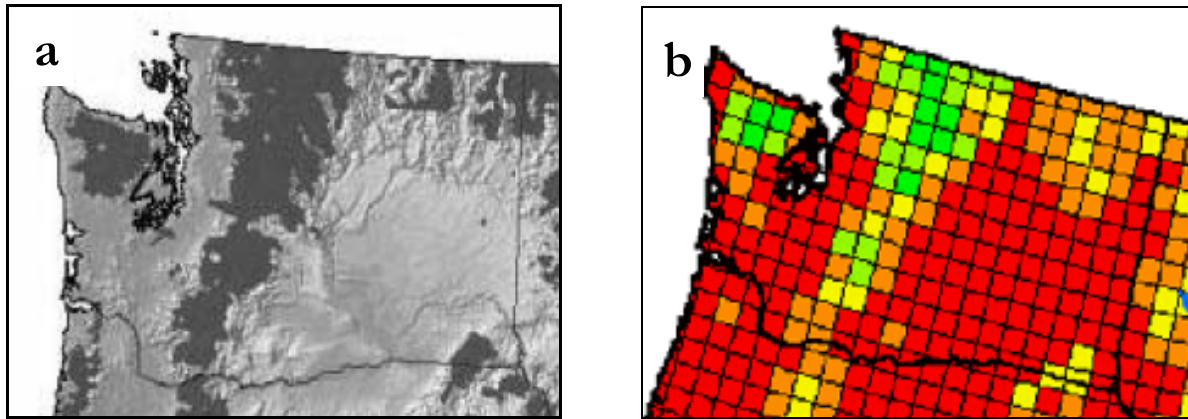


Figure 6. Estimated suitable wolf habitat in Washington depicted in two studies: (a) suitability was defined as those lands with a 50% or more probability of occurrence (dark gray shading; Larsen and Ripple 2006); and b) suitability was represented by values greater than 0.5 (Houts 2003). Colors represent different probabilities of occupancy from 0.0-0.69 (green = predicted suitable wolf habitat  $\geq 0.5$ ).

(2) Larsen and Ripple (2006) used prey density and the extent of human presence, forest cover, and public lands as parameters. They defined wolf habitat suitability as those lands that predicted a  $\geq 50\%$  probability of wolf occurrence (Figure 6a). Their results projected more suitable habitat in the northern Cascades than the Maletzke model (Figure 5), but none in southwestern Washington.

(3) Houts (2003) used logistic regression to model suitable wolf habitat in Washington (Figure 6b), the northern Rocky Mountain states, and Oregon based on road density and land cover data, using a 30 x 30 km grid to approximate an average wolf pack territory size. Houts (1999) found that most wolves in Idaho, Montana, and Wyoming were in areas with a mean road density less than 0.54 km per sq km, and in coniferous or mixed conifer/deciduous forests.

(4) Carroll et al. (2006) conducted a series of analyses of suitable wolf habitat in the western U.S., including Washington. The first analysis mapped much of western and northeastern Washington as suitable habitat based on vegetation type (used as a measure of prey abundance) and terrain (Figure 7a).

A second analysis predicted potential distribution and demography of wolves in the western U.S. using the spatially-explicit PATCH model (Schumaker et al. 2004) under five different landscape scenarios portraying current and future conditions. In this analysis, Washington was considered isolated from British Columbia and adjacent states. The PATCH model predicted low probability of occupancy and persistence in Washington under current conditions, except in the Olympic Peninsula and the Blue Mountains (Figure 7b). Using this projection, USFWS (2008a, 2009) reported that the Washington portion of the Northern Rocky Mountain distinct population segment (i.e., eastern one-third of Washington) contained only an estimated 297 square miles of potential wolf habitat. This projection has already proven to be a poor representation of suitable wolf habitat in the state, as evidenced by the five wolf packs all currently living in northeastern Washington and the Cascades in areas of low predicted occupancy.

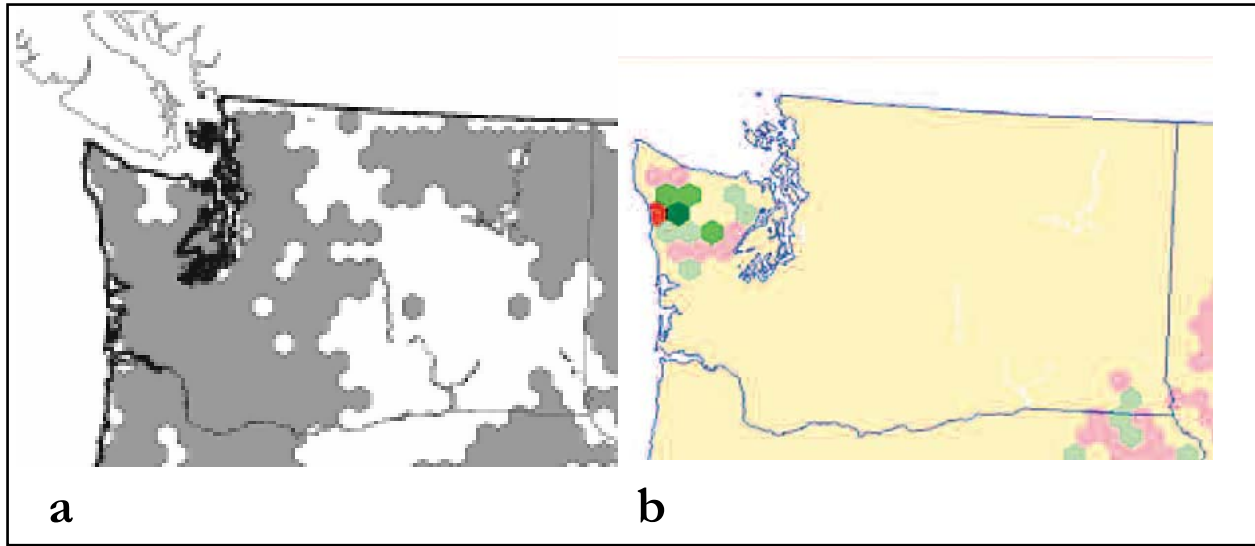


Figure 7. The estimates of Carroll et al. (2006) of (a) suitable wolf habitat in Washington (gray shading) based on vegetation parameters, and (b) potential wolf distribution predicted by the PATCH model under current habitat conditions. In (b), areas with predicted negative population growth rates are shown in pink and red, and are considered “sink” habitats. Those shown in shades of green have predicted positive growth rates and are considered “source” habitats. Areas in pale yellow are predicted to have low potential occupancy (less than 25%).

(5) In response to questions from the Wolf Working Group, Carroll (2007, unpubl. data) subsequently expanded his PATCH model analysis of suitable wolf habitat in Washington by considering the influence of linkages with habitat in British Columbia and adjacent states on predicted wolf distribution and demography. GIS data layers used were: (1) vegetative productivity; (2) road density and type together with human population density and distribution, which were used as a measure of wolf mortality (livestock density was not incorporated); and (3) habitat linkages with neighboring states and British Columbia.

The results identified areas of potential wolf habitat similar to those indicated by Maletzke (unpubl. data) and Larsen and Ripple (2006), including the Cascades, northeastern Washington, the Olympic Peninsula, and the Blue Mountains (Figure 8). However, most of the habitat within these areas, especially in the northern Cascades and northeastern Washington, was considered to be lesser quality “sink” habitat, where resident wolf populations would have difficulty persisting without ongoing immigration from neighboring “source” populations. Sink habitat is nonetheless considered vital in enhancing regional population viability by facilitating dispersal between source populations. In comparison, source habitats are higher quality habitats that support growing populations (source populations) and produce dispersing young. Source habitats therefore play a pivotal role in sustaining viable populations.

Models of suitable wolf habitat are most useful for understanding the relative proportions and distributions of various habitat characteristics related to wolf survival and shouldn’t be interpreted as absolute predictors of areas that will be occupied by wolves (USFWS 2008a). Estimates of suitable habitat calculated from four of the model results (estimates from Houts 2003 not available) range from a low of about 16,900 square miles (Carroll 2007) to a high of about 41,500 square miles

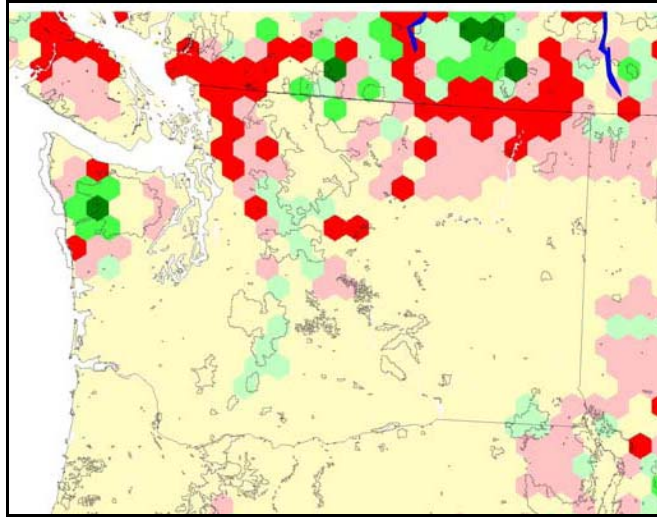


Figure 8. Potential wolf distribution in Washington and surrounding areas as predicted by Carroll (2007). Areas with predicted negative population growth rates are shown in pink and red, and are considered “sink” habitats. Those shown in shades of green have predicted positive growth rates and are considered “source” habitats. Areas in pale yellow are predicted to have low potential occupancy (less than 25%).

(Carroll et al. 2006). Maletzke’s (unpubl. data) results were about 26,700 square miles and Larsen and Ripple (2006) results were about 19,000 square miles. The average of the four models was about 26,025 square miles. Maletzke’s (unpubl. data) projection may be the most realistic because it used the parameters identified by Oakleaf et al. (2006) as the most important predictors of suitable wolf habitat, and it was able to use current WDFW GIS data layers for elk densities in the state. Both Larsen and Ripple (2006) and Carroll (2007) projected lower amounts of total suitable habitat because their results did not portray southwestern Washington as potential wolf habitat. The Carroll et al. (2006) model results were highest because they projected the Puget Sound lowlands as potential habitat. These differences in the models are likely artifacts of the parameters and GIS data layers used.

Models and observations from Idaho, Montana, and Wyoming during the past 20 years (Bangs et al. 2004, USFWS et al. 2011) indicate the types of habitat not suitable for wolves. These include non-forested rangeland and croplands associated with intensive agricultural use (Carroll et al. 2003, 2006, Larsen and Ripple 2006, Oakleaf et al. 2006, Carroll 2007, unpubl. data; B. Maletzke, unpubl. data). This unsuitability is due to high rates of wolf mortality, high densities of livestock compared to wild ungulates, repeated conflict with livestock, local cultural intolerance of large predators, and wolf behavioral characteristics that make them vulnerable to human-caused mortality in open landscapes (USFWS 2008a). Consequently, although a few wolves could potentially occupy the Columbia Basin in Washington, the likelihood of them persisting and establishing a viable breeding population is low. Lowland areas of the Puget Sound region are similarly not expected to support wolves because of the high human and road densities, lack of available prey, and reduced forest cover found there.

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*Road Density*

Several studies in the Great Lakes states have found road density to be an important predictor of wolf occupancy. Mladenoff et al. (1995) assessed various landscape-scale factors in defining suitable wolf habitat in the region and determined that road density was the most important predictor. Their model had a road density threshold of 0.72 mi/mi<sup>2</sup> that best classified areas with and without packs; areas containing packs usually had road densities <0.72 mi/mi<sup>2</sup>. This parameter allowed the amount and distribution of suitable wolf habitat to be mapped for the three-state region (Mladenoff et al. 1995) and the size of the potential wolf population to be estimated for northern Wisconsin and upper Michigan (Mladenoff et al. 1997). The habitat model and road density threshold of 0.72 mi/mi<sup>2</sup> successfully predicted the location of recolonizing wolves in Wisconsin from 1993 to 1997 (Mladenoff et al. 1999).

Road density was a key secondary variable, although with a higher threshold value (<0.72 mi/mi<sup>2</sup>), in a more recent model of wolf occupancy based on the locations of Wisconsin packs in 2007 (Mladenoff et al. 2009). The authors suggested that results of earlier models reflected the dynamics of a small, recolonizing wolf population in Wisconsin, whereas results from the newer model reflected wolf occupancy under a source-sink dynamic.

Potvin et al. (2005) found the probability of wolf occupancy was positively related to deer density as well as road density in upper Michigan. They identified threshold values of about 0.9-2.2 deer/mi<sup>2</sup> and 1.13 mi of road/mi<sup>2</sup> for predicting suitable wolf habitat. Nevertheless, most wolf territories occurred in areas with road densities lower than 0.72 mi/mi<sup>2</sup>. Wolves will use roads for travel, but road density is an index to human contact and roads contribute to wolf mortality through increased intentional or accidental killing.

*Biological Carrying Capacity*

Another factor considered for establishing wolf recovery goals in Wisconsin and upper Michigan was an assessment of their “biological carrying capacity” for wolves. The amount and distribution of available wolf habitat in the two states was estimated using data on landscape use by radio-collared wolves (Mladenoff et al. 1997). Potential wolf numbers were then estimated using two approaches: (1) a habitat area model, using available wolf habitat in combination with wolf pack territory size; and (2) a prey-based model, using wolf-prey biomass relationships. Potential wolf numbers based on habitat area and prey-based models were 380 (90% CI 324-461) and 462 (90% CI 262-662), respectively for Wisconsin, and 751 (90% CI 641-911) and 969 (90% CI 581-1357) for Michigan. Using this information, Wisconsin used a population of 500 wolves as the estimated potential biological carrying capacity of the state (Wydeven et al. 2009a).

Using the first of these approaches, WDFW estimated potential biological carrying capacity for wolves in Washington by overlaying a circle representing a pack territory size of 360 sq mi (933 km<sup>2</sup>) on a map of potential wolf habitat. Territory size used was based on the mean size of territories in Idaho and two packs in Washington. Amount of potential habitat was determined by the Maletzke model (≥50% probability of occupancy, using the parameters of Oakleaf et al. 2006; Figure 5) described in the previous section. The analysis resulted in an estimate of 76 circles for the state. As wolf recovery continues, WDFW will use Washington-specific data to refine estimates of biological carrying capacity in the state.

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## Landscape Connectivity and Dispersal

Some landscape features allow easy passage by wildlife species, whereas others such as unsuitable natural habitats, rugged topography, human development, and major highways may act as barriers that constrain, prevent, or redirect movements (Singleton et al. 2002). Landscape features can therefore influence: (1) levels of gene flow among populations; (2) rates of dispersal to unoccupied areas with suitable habitat, which can affect the establishment of new populations; and (3) rates of immigration into existing populations, which can affect the viability of populations, especially those with low survival or productivity and those occupying fragmented habitats.

Wolves are capable of dispersing long distances rapidly through a variety of habitats and select mates to maximize genetic diversity (USFWS 2008a). The recovery objectives established in this plan for wolves in Washington (see Section B of this chapter) recognize that the long-term viability of the state's wolf population will, in part, be dependent on maintaining its connectivity (e.g., vonHoldt et al. 2008) to the broader regional wolf metapopulation in Idaho, Montana, British Columbia, and Oregon. Additionally, maintaining connectivity between blocks of potentially suitable habitat within Washington is important to wolf conservation because of the fragmented condition of habitats in the state. Managing landscape permeability for the benefit of wolves will speed recolonization and progress toward recovery goals and will reduce the need for costly translocation efforts.

Singleton et al. (2002) analyzed landscape permeability for wolves in Washington and adjoining areas of Idaho and British Columbia (the Blue Mountains and Oregon were excluded). They reported that landscapes in the Cascades, north-central and northeastern Washington, and parts of the interior lowlands of British Columbia were broadly conducive for travel by wolves. However, five zones within the region were identified as impediments to movement, with the upper Columbia (Lake Roosevelt)-Pend Oreille valleys being the least permeable of these, followed by Snoqualmie Pass, Stevens Pass-Lake Chelan, the Fraser-Coquihalla region of British Columbia, and the Okanogan Valley. These zones generally represent developed valley bottoms with discontinuous forest cover, sizeable human populations, and high road densities, or reservoirs. Singleton et al. (2002) also showed a broad band of south-central British Columbia extending north from a line between about Osoyoos and Grand Forks as being of lower permeability for wolves, meaning that wolves attempting to move between eastern Washington and the Washington Cascades could find better travel conditions in the northern tier of Washington than in a sizeable portion of southernmost British Columbia.

Singleton et al.'s (2002) conclusions are generally supported by the work of others who have modeled potential wolf habitat in Washington (Carroll et al. 2006, Larsen and Ripple 2006; Carroll 2007, unpubl. data; B. Maletzke, unpubl. data). These studies variously showed the Okanogan, upper Columbia, and Pend Oreille valleys, Snoqualmie Pass, and high elevation areas of the North Cascades as being potential gaps in the distribution of wolves in eastern Washington (Figures 5-8) that would have to be crossed by individuals dispersing between major blocks of suitable habitat. Two additional areas, the I-5 corridor through Lewis and Cowlitz counties and the Chehalis River valley through Grays Harbor County, represent potential barriers to dispersal in western Washington. In contrast to Singleton et al. (2002), Carroll's (2007, unpubl. data) results suggested that southernmost British Columbia may hold better dispersal habitat (as indicated by the presence of "source" habitat) for wolves than northern Washington (Figure 8).

Maintaining cross-border habitat linkages between Washington and Idaho, British Columbia, and Oregon is vital to the reestablishment and long-term viability of a wolf population in Washington (Carroll 2007). Proximity to wolf populations in Idaho and Montana, which numbered a combined 1,271 animals in 2010 (USFWS et al. 2011), and good habitat connectivity along the northeastern Washington-northwestern Idaho border (Singleton et al. 2002; Carroll et al. 2006; Oakleaf et al. 2006; Carroll 2007, unpubl. data) provides a high probability that dispersing wolves will regularly enter Washington as long as this source population remains large.

Important cross-boundary habitat linkages also exist with British Columbia and Oregon and will benefit wolf recolonization in Washington. However, both of these jurisdictions currently have much smaller wolf populations in areas bordering Washington and therefore will likely be the source of fewer animals entering the state. Any management programs that significantly reduce wolf numbers in Idaho, Montana, British Columbia, and Oregon through regulated public hunting or other large-scale control actions will likely reduce rates of dispersal into Washington. Such activities would create vacancies within existing packs as well as areas of suitable habitat devoid of resident wolf packs, which will probably become occupied by some dispersing wolves before they travel to more distant areas such as Washington. The eventual formation of a source population of wolves in Washington will reduce the dependence on wolf dispersal into the state from outside. Over time, better knowledge of dispersal and immigration rates into Washington will emerge.

The Washington Connected Landscapes Project (WHCWH 2010) begins to address habitat connectivity issues through scientific analyses conducted at different spatial scales of current and future landscape conditions, and coordinates with transboundary partners to maintain connectivity across Washington's borders. A recently completed statewide analysis identifies important linkage areas between areas of suitable habitat using both a focal species and landscape integrity approach. While the focal species approach did not include the wolf, the analysis did address connectivity issues for elk and mule deer, two important prey species. The landscape integrity approach of the analysis identified large, contiguous areas of low human impact and linkage zones between these core areas that avoid areas of high human activity (e.g., urban, residential and industrial zones), which also is applicable to connectivity of wolf habitat. Future work will explore connectivity issues at the ecoregional and local levels.

Management tasks for maintaining and improving habitat connectivity for wolves in Washington are presented in Chapter 12, Task 7.

#### Comparisons between the Northern Rocky Mountain States and Washington for Wolves

During scientific peer review of this plan, several knowledgeable experts on wolves in the northern Rocky Mountain states commented that wolf restoration in Washington may resemble that which occurred in northwestern Montana from 1979 until well into the 1990s. In contrast to central Idaho and the greater Yellowstone area, both northwestern Montana and Washington lack large core refugia of secure habitat with large numbers of overwintering wild prey and few livestock (USFWS 2009). Instead, northwestern Montana and Washington feature much more fragmented habitat and a mix of public and private ownership; northwestern Montana also has large holdings of livestock, a natural prey base comprised mainly of deer, and less overall public support for wolf recovery. Because of this combination of characteristics, the wolf population in northwestern Montana grew relatively slowly in numbers and distribution (Bangs et al. 1998). After the first two wolves were

recorded in 1979, the first documented breeding pair did not occur until 1986 and six successful breeding pairs did not become established until 1995.

Wolf numbers were dampened during this period by wolf-livestock conflicts resulting in significant lethal control, deaths from cars and trains, illegal human-caused mortality, declining ungulate density due to severe winter weather, disease, and an apparently slow rate of immigration from adjacent areas of Alberta and British Columbia, where management appeared to be aggressive enough that fewer wolves than expected dispersed into Montana (Bangs et al. 1998, Sime et al. 2007, Murray et al. 2010, Smith et al. 2010; C. Sime, pers. comm.). Additionally, Glacier National Park and large adjoining wilderness areas to the south did not function as core secure habitat for wolves because their high elevations and harsh winters do not allow significant numbers of ungulates to overwinter (Smith et al. 2010; D. Smith, pers. comm.). Wolves in northwestern Montana had among the lowest average pack sizes and population growth rates in the northern Rocky Mountain states through 2005 (Mitchell et al. 2008). Despite these characteristics, the population showed stronger growth during the 1990s and 2000s, with immigration from central Idaho helping supplement the population after 2002. Because of the proportionally greater level of conflicts with humans, management of wolves in northwestern Montana has required greater agency intervention and cost than wolf restoration efforts in the greater Yellowstone area, central Idaho, and the Great Lakes states (E. Bangs, pers. comm.).

## **B. Recovery Objectives for Washington**

The plan sets recovery objectives to downlist wolves from endangered to threatened, threatened to sensitive, and to delist from sensitive status per WAC 232-12-297. The objectives were developed from a combination of current scientific knowledge about wolves in other locations and in Washington, wildlife conservation and population viability principles, and discussions with the Wolf Working Group, with input from WDFW, scientific peer review, and an analysis of assumptions and risks.

### Definition of Recovery Terms

Recovery objectives are defined as numbers of successful breeding pairs that are maintained on the landscape for 3 consecutive years, with a set geographic distribution within 3 specified recovery regions.

#### *Successful Breeding Pairs*

Consistent with the recovery objectives for the Northern Rocky Mountain distinct population segment, the recovery objectives in this plan are based on numbers of successful breeding pairs rather than packs or individuals. “Successful breeding pair” is used as the unit of measurement because it provides a higher level of certainty in assessing population status and documenting reproduction. A successful breeding pair of wolves is defined as an adult male and an adult female with at least two pups surviving to December 31 in a given year. (This term was formerly known simply as “breeding pair,” but Mitchell et al. [2008] recommended use of “successful breeding pair” as a more precise term to indicate that successful rearing of young had occurred.) The U.S. Fish and Wildlife Service used successful breeding pair as their recovery measure “because wolf populations are maintained by packs that successfully raise pups” (USFWS 1994, Mitchell et al. 2008). Success of

breeding pairs is measured in winter because most wolf mortality occurs from spring through fall, and winter is the beginning of the annual courtship and breeding season (USFWS 2008a). In Washington, verification of successful breeding pairs will be done by WDFW using established protocols.

Consistent with protocols used in the northern Rocky Mountain states, and to avoid double-counting successful breeding pairs of wolves, packs with territories straddling recovery region or state boundaries will be counted in the area where the den site is located. If the den location is not known with certainty, then other criteria such as amount of time, percent of territory, or number of wolf reports will be used to determine pack residency. Thus, a pack will not be counted in more than one recovery region in the state.

#### *Time Requirement*

Also consistent with the Northern Rocky Mountain objectives and state recovery plans for other listed species in Washington, the objectives in this plan must be maintained for 3 consecutive years. This requirement adds greater certainty that reproductive success (as reflected in breeding pair numbers) and total population size will be maintained over time.

#### *Distribution within Recovery Regions*

One of the criteria for removing a species from state listed status in Washington is that it must occupy a significant portion of its original geographic range. A “significant portion of the species’ historical range” is defined under WAC 232-12-297, section 2.9, as that portion of a species’ range likely to be essential to the long-term survival of the population in Washington. To achieve distribution across a significant portion of the species’ historical range in the state, recovery regions with their own population objectives are typically established.

Three recovery regions are designated to achieve wolf recovery in a significant portion of the range in Washington and are identified as the Eastern Washington region, Northern Cascades region, and Southern Cascades and Northwest Coast region (Figure 9). Wolves do not need to be distributed throughout the Southern Cascades and Northwest Coast recovery region to achieve the recovery objectives. If they occur in the Olympic Peninsula or southwest Washington, they will count, but they are not required to be there in order to delist.

The western boundary of the Eastern Washington region follows Highways 97 (British Columbia border south to Monse), 17, and 395 (Mesa south to the Oregon border) and matches the line used by the U.S. Fish and Wildlife Service to demarcate the western edge of the Northern Rocky Mountain distinct population segment for gray wolves in Washington (USFWS 2009). The boundary between the Northern Cascades region and the Southern Cascades and Northwest Coast region is Interstate 90 and the county borders.

Although wolves historically occurred throughout Washington, they do not need to reoccupy all of their former range to meet the recovery objectives of this plan. The northern and southern Cascade Mountains contain much of the “significant portion of the historical range” that would ensure the long-term survival of the population. However, despite the presence of considerable high quality

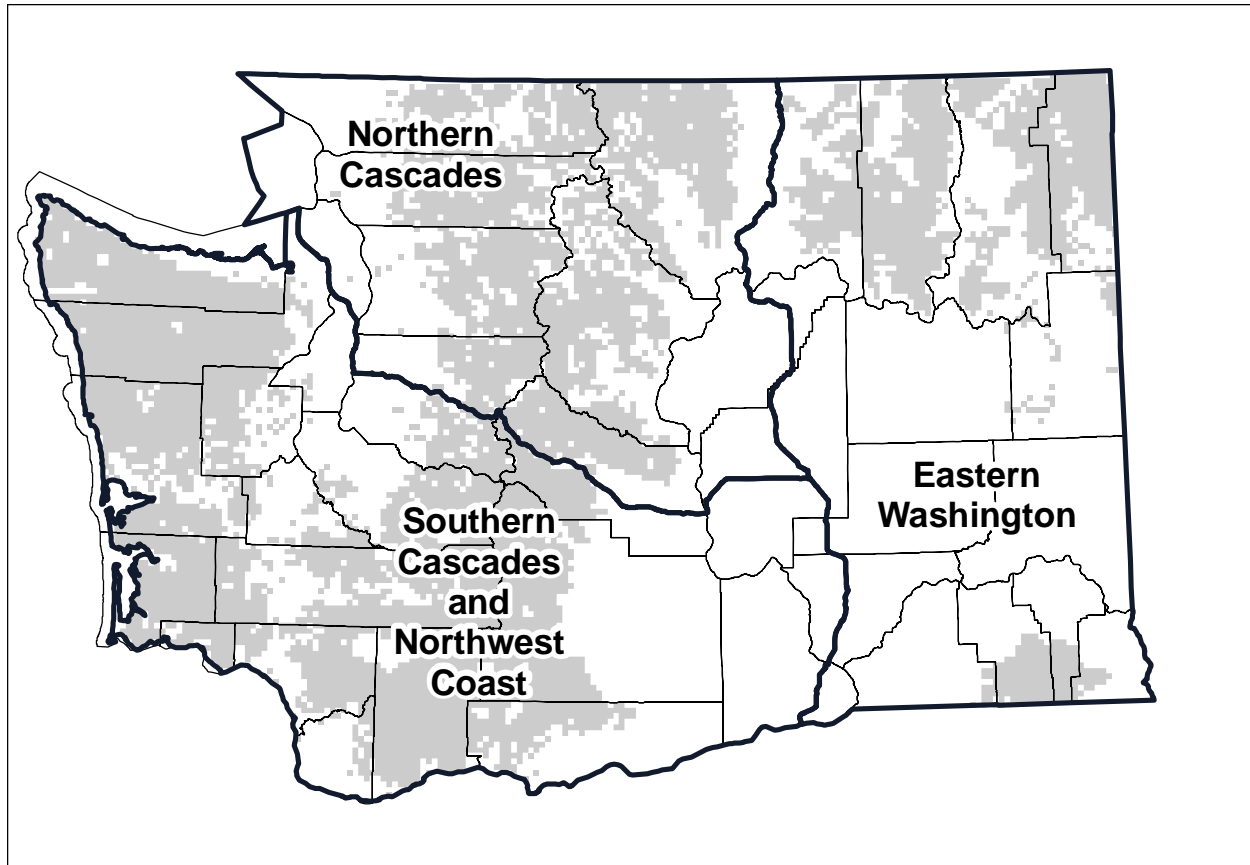


Figure 9. Washington's three gray wolf recovery regions (Eastern Washington, Northern Cascades, and Southern Cascades and Northwest Coast) superimposed on the estimated suitable habitat for wolves ( $\geq 50\%$  probability of occupancy, modeled by B. Maletzke, using Oakleaf et al. 2006).

habitat for wolves on the Olympic Peninsula and in southwestern Washington (Figure 10), wolves would not need to occupy these areas to achieve recovery if they were present in both halves of the Cascades and eastern Washington in sufficient numbers to satisfy the recovery objectives for each of the three recovery regions. Eastern Washington is currently being recolonized from adjacent populations in neighboring states and British Columbia, whereas the Olympic Peninsula and southwestern Washington are distant from colonizing sources and separated by additional potential barriers inhibiting natural dispersal. Recovery is therefore likely to happen more quickly through the reoccupation of eastern Washington than waiting for wolves to reach far western Washington.

In particular, the southern Cascade Mountains contain a large amount of high quality habitat (Figure 10). This area contains abundant natural prey for wolves, including nearly half of Washington's elk population, and large contiguous blocks of forested public and private lands, where low levels of conflict with livestock are expected. As a result, the southern Cascades have the potential to support a source population of wolves, a factor of importance with regard to the long-term survival of the wolf population in Washington.

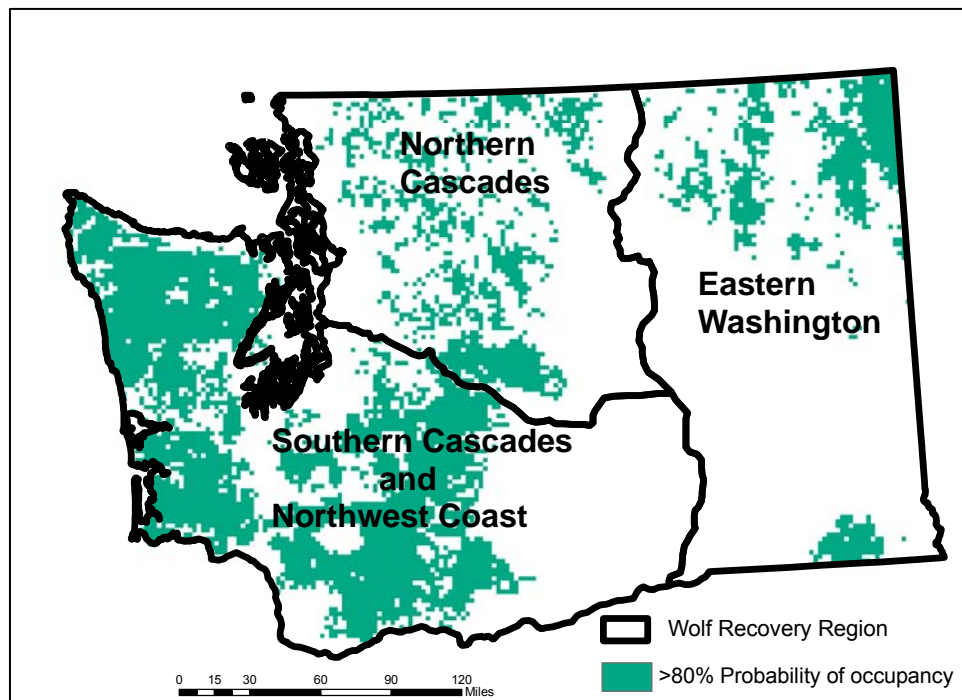


Figure 10. Modeled high quality habitat for wolves in Washington (i.e., >80% probability of occupancy), as determined by B. Maletzke using the parameters of Oakleaf et al. (2006).

#### *Land Ownership of Potentially Suitable Wolf Habitat in Washington*

Land ownership of potentially suitable wolf habitat ( $\geq 50\%$  probability of occupancy, modeled by B. Maletzke, using Oakleaf et al. 2006) was determined for each of the wolf recovery regions in Washington (Figure 11, Table 3). The majority (64%) of this habitat is on public land, varying from 53-87% per region. The U.S. Forest Service is the primary administrator of these lands, both statewide and in each recovery region (Table 3). The National Park Service and Washington Department of Natural Resources are other significant public landowners supporting extensive amounts of potential wolf habitat, especially in the Northern Cascades and Southern Cascades and Northwest Coast recovery regions. Private lands (particularly those owned by private timber companies) comprise 27% of the state's potential wolf habitat, with the most extensive area occurring in the Southern Cascades and Northwest Coast recovery region. Tribal lands comprise 9% of potential wolf habitat statewide and are especially significant in the Eastern Washington recovery region.

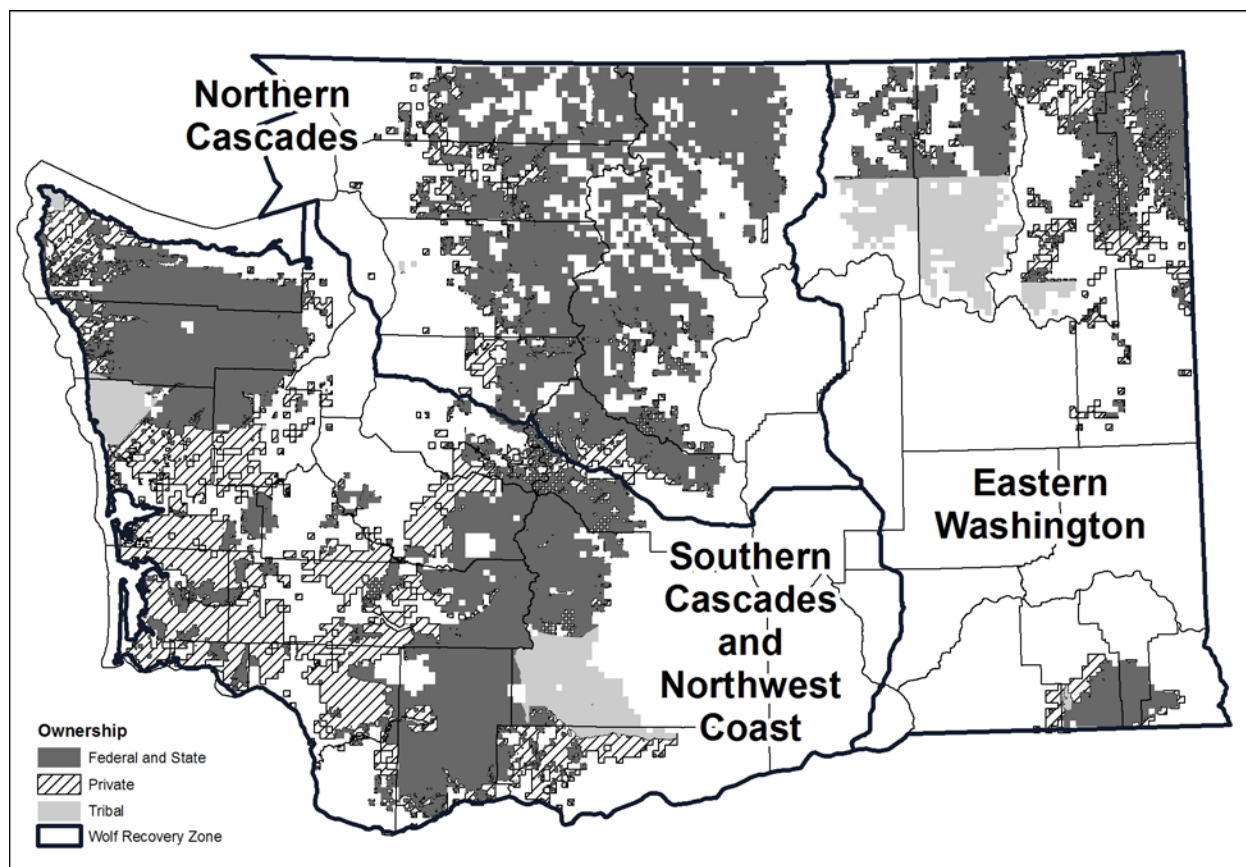


Figure 11. Public (federal and state), private and tribal landownership of potentially suitable wolf habitat ( $\geq 50\%$  probability of occupancy, modeled by B. Maletzke, using Oakleaf et al. 2006) in the three recovery regions in Washington.

Table 3. Land ownership of potentially suitable wolf habitat ( $\geq 50\%$  probability of occupancy, modeled by B. Maletzke, using Oakleaf et al. 2006) within the three recovery regions in Washington.

Land ownership	Recovery Region							
	Eastern Washington		Northern Cascades		Southern Cascades & Northwest Coast		Total	
	Acres	%	Acres	%	Acres	%	Acres	%
<b>Federal</b>								
US Forest Service	1,543,547	45	3,566,440	70	2,583,831	28	7,693,819	43
National Park Service	148	<1	357,166	7	1,128,258	12	1,485,572	8
US Dept of Defense	453	<1	2,173	<1	54,698	<1	57,325	<1
US Fish and Wildlife Service	44,869	1	1,111	<1	5,982	<1	51,961	<1
US Bureau of Land Management	1,305	<1	5	<1	0		1,310	<1
US Bureau of Reclamation	22,921	<1	2,984	<1	3,817	<1	29,721	<1
<b>Total</b>	<b>1,613,244</b>	<b>47</b>	<b>3,929,879</b>	<b>77</b>	<b>3,776,586</b>	<b>41</b>	<b>9,319,708</b>	<b>52</b>
<b>State</b>								
Dept of Natural Resources	140,562	4	491,318	10	1,064,209	11	1,696,089	10
Dept of Fish and Wildlife	8,710	<1	29,324	<1	70,782	<1	108,816	<1
State Parks	14,218	<1	6,778	<1	11,121	<1	32,116	<1
Universities	0		0		994	<1	994	<1
Other	0		0		1,418	<1	1,418	<1
<b>Total</b>	<b>163,490</b>	<b>5</b>	<b>527,420</b>	<b>10</b>	<b>1,148,524</b>	<b>12</b>	<b>1,839,433</b>	<b>10</b>
<b>City</b>	<b>1,183</b>	<b>&lt;1</b>	<b>12,221</b>	<b>&lt;1</b>	<b>100,704</b>	<b>1</b>	<b>114,108</b>	<b>&lt;1</b>
<b>County</b>	<b>375</b>	<b>&lt;1</b>	<b>3,708</b>	<b>&lt;1</b>	<b>33,273</b>	<b>&lt;1</b>	<b>37,355</b>	<b>&lt;1</b>
<b>Private</b>	<b>763,094</b>	<b>22</b>	<b>614,681</b>	<b>12</b>	<b>3,480,552</b>	<b>37</b>	<b>4,858,327</b>	<b>27</b>
<b>Tribal</b>	<b>857,610</b>	<b>25</b>	<b>5,770</b>	<b>&lt;1</b>	<b>745,261</b>	<b>8</b>	<b>1,608,642</b>	<b>9</b>
<b>Total</b>	<b>3,398,996</b>		<b>5,093,679</b>		<b>9,284,899</b>		<b>17,777,574</b>	

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## Recovery Objectives

The following recovery objectives have been identified to transition from one listed status to the next:

**1. The gray wolf will be considered for downlisting from state endangered to threatened when 6 successful breeding pairs are present for 3 consecutive years, with:**

- 2 successful breeding pairs in the Eastern Washington region,
- 2 successful breeding pairs in the Northern Cascades region, and
- 2 successful breeding pairs distributed in the Southern Cascades and Northwest Coast region.

**2. The gray wolf will be considered for downlisting from state threatened to sensitive when 12 successful breeding pairs are present for 3 consecutive years, with:**

- 4 successful breeding pairs in the Eastern Washington region,
- 3 successful breeding pairs in the Northern Cascades region, and
- 5 successful breeding pairs distributed in the Southern Cascades and Northwest Coast region.

**3. The gray wolf will be considered for delisting from state sensitive when 15 successful breeding pairs are present for 3 consecutive years, with:**

- 5 successful breeding pairs in the Eastern Washington region,
- 4 successful breeding pairs in the Northern Cascades region, and
- 6 successful breeding pairs distributed in the Southern Cascades and Northwest Coast region.

There is no requirement that wolves must go through each listed stage before downlisting or delisting if they meet the recovery objectives. If the wolf population increased rapidly in numbers and distribution, then it may be eligible for skipping a listing stage. For example, if 12 or more successful breeding pairs became reestablished in the state in the first few years of the plan's implementation and met the distribution objectives for 3 consecutive years, then WDFW could move ahead with downlisting from endangered to sensitive status.

The higher successful breeding pair requirements for the Southern Cascades and Northwest Coast recovery region reflect the larger amounts of prey and high quality habitat in this region (Figure 10, Tables 3 and 11; see Chapter 5, Section C). Breeding pair requirements are higher in the Eastern Washington recovery region than in the Northern Cascades recovery region because one of the breeding pairs in Eastern Washington will likely occur in the Blue Mountains. A pair located there would likely be isolated from other wolves in the state and would therefore not contribute to recovery of the species. Additionally, assignment of higher breeding pair numbers in Eastern Washington reflects the importance of this region as a source of dispersing wolves to other parts of the state during listed status.

## Assumptions and Rationale

### *Estimated Numbers of Wolves Represented by Successful Breeding Pairs*

Table 4 provides estimates of the numbers of packs and individuals that the recovery objectives might represent. The estimates are made using two methods. The first determines the number of packs equivalent to a specified number of successful breeding pairs using the lowest and highest probabilities of a pack containing a successful breeding pair, as determined for five regions of Idaho, Montana, and Wyoming (excluding Yellowstone National Park) from 1979-2005 (Mitchell et al. 2008). Successful breeding pair numbers are typically smaller than pack numbers because not all packs breed or successfully rear pups, and because logistical difficulties may prevent the confirmation of breeding in some packs, especially as pack numbers become larger (USFWS et al. 2008). Estimates of the number of wolves present in packs are based on averages varying from a minimum of  $5.1 \pm 1.1$  (SD) to a maximum of  $7.3 \pm 2.3$  wolves per pack in the same regions of Idaho, Montana, and Wyoming from 1979-2005 (Mitchell et al. 2008). Estimates of the number of lone wolves are based on lone wolves comprising 10-15% of most populations (Fuller et al. 2003). Estimates of the total number of wolves in the population are the sum of the estimated numbers in packs and lone wolves.

**Table 4. Range of numbers of packs, lone wolves, and total number of wolves that might correspond to numbers of successful breeding pairs at different recovery stages in Washington.**

	Endangered to threatened	Threatened to sensitive	Sensitive to delisted
No. of successful breeding pairs	6	12	15
Estimated equivalent no. of packs	7-17	14-33	17-42
Estimated no. of wolves in all packs combined	36-124	71-241	87-307
Estimated no. of lone wolves	4-22	8-43	10-54
Total estimated no. of wolves present	40-146	79-284	97-361
Total estimated no. of wolves present, using 14 wolves per successful breeding pair <sup>e</sup>	84	168	210

Using this method, 6 successful breeding pairs would correspond to a range of 40-146 total wolves, 12 successful breeding pairs with a range of 79 to 284 wolves, and 15 successful breeding pairs with a range of 97 to 361 wolves (Table 4). Data from Idaho and Montana indicate that the number of successful breeding pairs and packs are usually similar early in recovery (USFWS et al. 2009; C. Sime, unpubl. data), when closer monitoring of each pack can be performed. Thus, expected numbers of packs and wolves in Washington during the endangered and threatened stages are likely to be on the lower end of the range of estimates presented here.

The second method uses long-term data collected in Idaho, Montana, and Wyoming that indicate that each successful breeding pair corresponds to about 14 wolves in the overall wolf population in mid-winter (USFWS 2009). Based on this estimate, 6 successful breeding pairs would correspond to 84 wolves in the overall mid-winter population, 12 successful breeding pairs with 168 wolves in the

overall population, and 15 successful breeding pairs with 210 wolves in the population (Table 4). These estimates fall within the range of estimates using the first method.

#### *Analysis of the Adequacy of the Recovery Objectives*

Using either method to estimate numbers of wolves, the delisting objective of 15 successful breeding pairs may represent a range of 97 to 361 wolves, and may be expected to be on the lower end of the range of estimates (Table 4). As such, the recovery objectives for Washington are likely to be below those thought to be needed for long-term persistence of an isolated wolf population (i.e., 30 or more successful breeding pairs containing 300 or more animals in a metapopulation (WDNR 1999, USFWS 2008a; see Section A of this chapter), and well below the 2001-2002 conclusions of wolf experts queried by the U.S. Fish and Wildlife Service that 500 or more wolves would be more likely to result in a viable wolf population than the Service's original objective of 300 wolves.

In the blind peer review process, two of the three blind peer reviewers stated that the recovery objectives in WDFW's draft wolf plan were inadequate with respect to wolf recovery objectives. Both believed that the number of successful breeding pairs needed to achieve delisting should be higher and that the plan fell below current scientific standards for sustainability and genetic viability. Both recommended that a population viability analysis be conducted to determine appropriate recovery criteria for wolves in Washington. The third reviewer considered the plan's recovery objectives reasonable for achieving a recovered and self-sustaining wolf population.

However, Washington's delisting objective of 15 successful breeding pairs distributed across three recovery regions and maintained for 3 consecutive years is believed to be sufficient to result in the reestablishment of a self-sustaining recovered wolf population because of the distribution and time requirements included in the objectives, and assumptions that the population would be allowed to continue to grow. These criteria, plus connectivity (e.g., vonHoldt et al. 2008) with populations in Idaho, Montana, British Columbia, and Oregon, are assumptions essential to the 15 successful breeding pairs being considered an adequate, though minimal, objective to achieve recovery.

#### *Long-Term Persistence Modeling of Recovery Objectives*

WDFW evaluated whether available data support the objective of 15 successful breeding pairs as a reasonable level to delist a growing wolf population by using spatially explicit population model RAMAS software (Akçakaya 2002) to model future colonization and persistence of wolf populations in Washington. The results of this exercise are not considered definitive, and vary widely depending on the assumptions used, especially about wolf survival and immigration. A word of caution is advised in interpreting model results. Models are a useful tool, but rarely provide perfect predictions of population growth.

RAMAS links spatial habitat information with demographic data using packs as subpopulations of a metapopulation. The metapopulation model was developed by the Carnivore Lab at Washington State University under contract to WDFW, and was validated by comparison with observed populations in Idaho and northwestern Montana (Appendix G). Population model parameters were based on information available from wolf populations in Idaho and Montana (Mitchell et al. 2008, Smith et al. 2010). Conservative assumptions were used to evaluate persistence and extinction risks. These included territory size, mortality rates (including mortality from lethal control and illegal

1 killing), immigration, and available habitat and its potential to support wolf packs. Circles  
2 representing hypothetical wolf territories of 360 mi<sup>2</sup> (933 km<sup>2</sup>) were systematically placed across a  
3 map of potential wolf habitat in Washington, which was determined using the parameters of Oakleaf  
4 et al. (2006) and a 0-100% probability of occupancy. Territory size was based on data from Idaho (n  
5 = 13; USFWS 2000) and Washington (n = 2). Only those circles that averaged greater than 40%  
6 probability of occupancy were included in the analysis. Predicted wolf population projections for 50  
7 years were done using 100 repeated simulations based on the modeled habitat and selected set of  
8 assumptions. Additional model assumptions are listed in Appendix H, including presence and  
9 absence of immigration.

10  
11 The persistence of a metapopulation of 15 successful breeding pairs for 50 years, arranged within  
12 recovery regions as proposed in the delisting objectives, was evaluated under five different scenarios  
13 (Appendix H). Because 30% of packs do not successfully reproduce in any particular year (Mitchell  
14 et al. 2008), a minimum of 23 packs (i.e., territories) was used to represent a population level at or  
15 above the delisting objective of 15 successful breeding pairs. The 23 packs were distributed in the  
16 Eastern Washington (7), Northern Cascades (7), and Southern Cascades and Northwest Coast (9)  
17 recovery regions to represent the recovery objective distribution of 5, 4, and 6 successful breeding  
18 pairs in the three recovery zones, respectively. The hypothetical territories used were those with the  
19 highest predicted probability of occupancy and did not include the Olympic Peninsula or  
20 southwestern Washington.

21  
22 Scenarios 1-3 assumed that the population was allowed to grow and wolves colonized additional  
23 areas. Under these assumptions, the scenarios suggested that 15 successful breeding pairs was an  
24 adequate recovery objective for delisting and managing wolves as a non-listed species, with little or  
25 no probability (0-2%) of the population falling below the delisting goal of 15 pairs during the 50  
26 years, even without immigration into the population (Appendix H).

27  
28 This was not the case if the wolf population was assumed to be capped at 15 successful breeding  
29 pairs (i.e., 23 occupied territories). In this situation (scenarios 4, 5), the model suggested a 93%  
30 probability of the wolf population falling below the delisting goal of 15 successful breeding pairs  
31 during the 50 years and requiring relisting even when immigration occurred; with no immigration,  
32 the probability rose to 97%.

33  
34 Currently, there is little empirical data from wolves in Washington to include in population  
35 persistence modeling. The population will be monitored as wolves recolonize the state to determine  
36 trends in abundance, demographic parameters, habitat use, prey relationships, outcomes of  
37 interactions with humans, and other factors pertaining to population growth. In addition, the  
38 permeability of habitat and frequency of successful dispersal between isolated populations of wolves  
39 both within the state and between Washington and adjacent populations in British Columbia, Idaho,  
40 and Oregon will be monitored. The expectation is that over time, as wolves recolonize Washington,  
41 WDFW will be able to collect data from within the state to determine whether the model  
42 assumptions are appropriate.

43  
44 If future data reveal that the population dynamics of wolves in Washington are significantly different  
45 from those used in the model, these conclusions will need to be reevaluated. Incorporating wolf  
46 demographic data specific to Washington will allow WDFW to update predictions of population  
47 persistence during wolf recovery phases and to revise the recovery objectives, if needed.

## Delisting

The plan's recovery objectives represent the numbers needed to achieve the downlisting and delisting of wolves in Washington and do not carry implications for ultimate numbers of wolves that will exist in the state. The delisting objective of 15 successful breeding pairs (with adequate geographic distribution for 3 consecutive years) is not a population "cap" at which the population will be limited. The plan does not place a limit on the numbers of wolves that will be allowed to live in Washington.

When Washington's wolf population reaches the delisting objective (15 breeding pairs for 3 consecutive years in appropriate distribution), WDFW will begin the process of proposing delisting of the species. This process, described in WAC 232-12-297 (Appendix A), requires the preparation of a status review that examines all pertinent information on abundance, the achievement of recovery objectives, and ongoing threats. Review under the State Environmental Policy Act (SEPA) and public review are also required as part of the delisting process. Delisting is based only on the biological status of the species in Washington. Information from the status review is then presented to the Washington Fish and Wildlife Commission to make the final determination on delisting.

If, during the 3-year period, a year occurred where there were 18 successful breeding pairs of wolves and the distribution criteria for delisting were met, then WDFW could begin the process to write a status review to prepare a delisting recommendation at that time, rather than wait for the 3-year period to conclude. However, wolves would not be proposed for delisting until they had achieved the delisting objectives for 3 consecutive years.

## Conservation and Management Tools

A variety of conservation strategies and management tools will be considered to meet recovery objectives while wolves remain state listed in Washington. These are outlined in Chapter 12, with strategies and tasks identified. They include (1) protection and monitoring of wolves as they disperse into Washington and establish breeding packs; (2) translocation (discussed below); (3) prevention of illegal killing; (4) measures to assist livestock producers in reducing wolf-livestock conflicts, including proactive deterrents, compensation programs for wolf-related livestock losses and proactive methods, and various harassment options and forms of limited lethal control (see Chapter 4); (5) management of prey populations and their habitat; (6) management of human safety concerns and wolf-pet conflicts; (7) preservation and enhancement of habitat connectivity for wolves; (8) implementation of a comprehensive outreach and education program; and (9) research.

### *Translocation*

Wolves will naturally disperse into unoccupied suitable habitat across ownerships and administrative designations, resulting in the recolonization of new areas of Washington. Singleton et al. (2002) evaluated landscape permeability for wolves in Washington and suggested that even the two areas likely representing the greatest impediments to wolf dispersal (i.e., the upper Columbia-Pend Oreille Rivers and Snoqualmie Pass) were nevertheless probably permeable for wolves. It is recognized, however, that there may be barriers inhibiting natural dispersal and establishment of wolf packs, particularly for wolves attempting to disperse across the existing mix of private and public lands between northeastern Washington and the northern Cascades and from the southern Cascades to

the Northwest Coast due to distance, human-caused mortality, or other potential bottlenecks to natural dispersal.

The overall timeframe for wolves to reach recovery objectives for downlisting and delisting in Washington is difficult to predict, but it may be slow (Carroll 2007) and could take years to several decades. Based on the proximity of wolf packs in neighboring states and British Columbia and the current locations of the few packs present in Washington, the northeastern and southeastern corners of the state and the northern Cascades and Pasayten Wilderness will be the most likely areas to be initially occupied through natural dispersal. The southern Cascades and western Washington will take longer to recolonize.

Translocation (moving animals from one area of Washington to another to establish a new population) is an important conservation tool (Appendix I). This tool may be needed to establish populations in recovery regions that wolves have failed to reach through natural dispersal. Potential benefits of translocation are that it could:

- Address impediments to natural dispersal such as extensive areas of private lands and unsuitable habitat, or excessive mortality from illegal killing, lethal control, vehicle collisions, or other human-related causes.
- Reduce wolf numbers in some regions where they may increase to carrying capacity prior to downlisting and delisting objectives being met in other recovery regions,
- Hasten establishment of breeding pairs in areas that are potentially capable of supporting a source population, thereby helping to ensure and maintain viable populations in a significant portion of the state's historical range, as required to meet state recovery objectives.
- Help lower the overall costs of recovery by achieving population target levels more quickly, thereby allowing downlisting and delisting to begin earlier. Costs would be reduced by replacing the more expensive monitoring of breeding pairs that is needed while wolves are listed with the less expensive monitoring of packs following delisting.
- Facilitate achieving recovery goals more quickly, thereby leading to greater management flexibility in addressing conflicts.

Evaluation of translocation efforts could begin when one recovery region had exceeded its delisting requirements by at least one breeding pair, while another recovery region remained unoccupied. Wolves would only be translocated out of a recovery region if that region exceeded delisting objectives and removal would not cause the region's population to fall below its delisting objectives.

If translocation were to be considered, a feasibility assessment would be needed to determine if sufficient suitable habitat and prey were available to support wolves at potential translocation sites in the recipient region, and to ensure that removal of wolves from the source region would not cause it to fall below delisting objectives. If these conditions are met, an implementation plan would be prepared, which would provide detailed information on translocation methods and the selection of a release site(s). This would include consideration of genetics in selecting the source population.

A public review process would then be conducted to evaluate the translocation proposal. If the proposed translocation site were on federal land, the review process would be conducted under the National Environmental Policy Act (NEPA); if it were proposed on non-federal land, the State Environmental Policy Act (SEPA) process would be used. WDFW biologists would coordinate

with other land management agencies to determine a suitable location to release wolves. Coordination with federal and other state agencies, tribal governments, landowners, and non-governmental organizations would also take place throughout the process. It is recognized that if wolves are still federally listed in portions of Washington when translocation is proposed, collaborative discussions with the U.S. Fish and Wildlife Service will be needed for approval to implement translocations (E. Bangs, pers. comm.).

If the translocation proposal were approved following the NEPA/SEPA process, the translocation would then occur followed by post-release monitoring to evaluate success of the project. Some areas that were identified where recolonization may be slow or difficult were the southern Cascade Mountain range and the Northwest Coast region.

### **C. Management after Delisting**

#### Reclassification upon Delisting

All classification of wildlife is under the authority of the Washington Fish and Wildlife Commission. After the recovery objectives for delisting are met, wolves could be reclassified as a game animal through the Commission's public process. If reclassified to a game species, statewide management goals would be established to preserve, protect, perpetuate, and manage wolves and their habitats to ensure a healthy, productive population with long-term stability (D. Ware, pers. comm.). It would not be a population "cap" intended to keep numbers beneath a specific level. Placing a numerical cap on the wolf population is undesirable for several reasons, including 1) that the population should be managed at a biologically and socially acceptable size (which is currently undetermined), as is done with all other carnivore species in the state, 2) WDFW would need to devote considerable resources to monitoring wolves in perpetuity to ensure that numbers don't exceed the cap, and 3) as suggested by WDFW's population modeling (Appendix H, scenarios 4 and 5), a cap set at or near the delisting objective would very likely result in the long-term decline of the population below 15 successful breeding pairs, requiring relisting.

After state delisting, WDFW intends to develop a new plan for managing wolves.

#### Hunting

This plan addresses wolf conservation and management while it is state listed. After delisting, it is anticipated that the WDFW would recommend listing as a game species. Proposals to hunt wolves following delisting would go through a public process with the Fish and Wildlife Commission. This process would address the diverse public values regarding hunting of wolves. If hunting of wolves were approved while population numbers were relatively low, it is likely that conservative approaches would be used initially. These approaches may include a mix of no hunting, hunting on a limited permit-only basis as is done for moose, bighorn sheep, and mountain goats in Washington, or a statewide hunting quota.

With regard to hunting, Mitchell et al. (2008) recommended that consideration should be given to protecting wolves in some core habitat areas (e.g., in large blocks of public lands) to maintain pack size and structure, thereby potentially retaining successful breeding pairs and reproductive output.

1 Hunting may also target areas of conflict to reduce the need for agency management and  
2 compensation, as is done for other species in Washington such as elk and geese.

3  
4 Montana and Idaho initiated hunting seasons immediately following delisting, when wolf population  
5 levels far exceeded the state recovery objectives. Minnesota adopted a phased approach, where  
6 wolves would not be hunted for five years after delisting to ensure that adequate population  
7 numbers were being maintained following delisting (MDNR 2001). In Wisconsin's plan, hunting  
8 could be considered once the population exceeded 350 wolves outside of Indian reservations and  
9 would require legislative approval (Wydeven et al. 2009b).

#### 10 11 Relisting

12  
13 As with all wildlife species, the state takes whatever management steps are necessary to safeguard the  
14 species from a population decline that would necessitate relisting. Upon delisting, the wolf  
15 population will be expected to increase across the landscape where suitable habitat and prey exist.  
16 However, it will continue to be affected by natural and human-caused mortality factors.

17  
18 WDFW will continue to monitor population status and trends after delisting. If the population were  
19 to start declining, WDFW would assess the population's size, distribution, health, reproductive  
20 status, and potential causal factors. If there are mortality factors causing the decline that can be  
21 controlled, such as poaching, lethal control actions, or legal hunting, actions will be taken to reduce  
22 these sources of mortality. A decline due to changing habitat conditions, low prey numbers, or  
23 disease could constitute underlying warning signs of a more serious situation that could warrant  
24 relisting.

25  
26 In the event of a decline approaching the minimum population objectives for delisting (including  
27 numbers and distribution), WDFW may immediately initiate a status review to determine whether  
28 relisting is appropriate. WDFW's listing procedures (WAC 232-12-297) also provide for emergency  
29 listing.  
30

## 4. WOLF-LIVESTOCK CONFLICTS

Addressing gray wolf-livestock conflicts is an essential part of this plan. Based on experiences in other western states with wolf populations, the return of wolves to Washington is expected to result in conflicts with livestock. The ranching and farming industry is a vital component of the Washington economy and provides important open space and habitats that support a wide variety of wildlife, including deer and elk. In some areas of the state, concerns have been raised regarding the effect that wolves will have on the livestock industry and a number of comments received at the initial public scoping meetings in 2007 and the public review period in 2009-2010 involved concerns about conflicts with livestock and how they are addressed.

The reestablishment of wolves in Washington will affect some livestock producers through wolf-related depredation and/or changes in husbandry and management methods needed for adapting to the presence of wolves. Projections of wolf-caused losses of livestock and related economic impacts in the state are described in Chapter 14, Section B. During the endangered and threatened phases of recovery, wolves should pose little detriment to the state's livestock industry as a whole. At the population levels associated with the early stages of recovery, a few individual producers will likely experience some livestock losses. Some of these costs would likely be offset by compensation from state or federal programs. As wolf populations become larger and more widely distributed, financial impacts to more producers are likely. Where and when depredations occur will depend on different factors, including the abundance and distribution of wolves and the husbandry methods and locations of livestock in areas occupied by wolves.

This chapter of the plan provides:

- background on wolf depredation on livestock (Section A)
- background on management measures available for reducing wolf depredation (Section B)
- background on wolf compensation programs in other states (Section C)
- predicted losses of ranch animals in Washington due to wolves (Section D)
- a description of the management tools to be used for managing wolf-livestock conflicts in Washington (Section E)
- steps for expanding the use of proactive measures for reducing conflicts in Washington (Section F)
- a recommended wolf compensation program to address livestock losses in Washington (Section G)

### A. Wolf Depredation on Livestock

The recovery of wolves in other states has resulted in depredations on cattle, sheep, other livestock, and guarding/herding dogs. However, despite significant increases in wolf populations, confirmed losses to wolves have remained small to date relative to livestock numbers (Bangs et al. 2005b, USFWS 2008a). Bangs et al. (2006) noted that while wolf depredations on livestock were unimportant to the regional livestock industry, they could affect the economic viability of some ranchers. Many factors influence depredation rates on livestock, including the proximity of livestock to wolf home ranges, dens, and rendezvous sites; pack size; abundance of natural prey and livestock;

amount and type of vegetative cover; time of year; livestock husbandry methods in both the area of concern and adjacent areas; the use of non-lethal deterrents and lethal take; pasture size; and proximity to roads, dwellings, and other human presence (Mech et al. 2000, Fritts et al. 2003, Treves et al. 2004, Bradley and Pletscher 2005). These factors also make it difficult to predict where and when depredations by wolves will occur.

USFWS et al. (2011) reported that on average 10-38% of all wolf packs in Montana were confirmed to have killed livestock in any given year from 1999 to 2010. In comparison, 33-85% of the packs in Wyoming outside of Yellowstone National Park were involved in depredations annually from 2005 to 2010 (USFWS et al. 2006-2011). In contrast, predation risk is usually lower in areas where livestock herds are fenced (e.g., in Wisconsin, where only about 7% of wolf packs annually depredated livestock; Wydeven et al. 2004). Wolves don't necessarily attack livestock whenever livestock are encountered, but most wolf packs that regularly encounter livestock are likely to depredate at some point (Bangs and Shivik 2001, Wydeven et al. 2004). Some packs show increasingly frequent depredation behavior, while others may do so once or twice a year, every other year, or even less frequently (USFWS et al. 2011).

Sime et al. (2007) reported that among the 162 livestock producers suffering confirmed wolf depredation in Montana between 1987 and 2006, 62% experienced a single incident, 20% experienced two incidents, and 17% experienced three or more incidents. A similar percentage (59%) of livestock owners with wolf depredation in Wisconsin experienced a single incident between 1976 and 2000 (Treves et al. 2002); these affected livestock owners represented 0.4% of the 7,424 full-time livestock producers in the state's 19 counties with verified wolf depredations. In Minnesota, the number of livestock farms with verified wolf depredations on livestock was 0.3% annually during the period when there were 1,200-1,416 wolves (Ruid et al. 2009).

In the northern United States, wolf depredation on livestock occurs more frequently from March to October when livestock spend more time under open-grazing conditions, calving is taking place, and wolf litters are being raised (Fritts et al. 2003, Musiani et al. 2005, Sime et al. 2007, Edge et al. 2011). Untended livestock, particularly young calves, appear to be more vulnerable, and the presence of livestock carcasses on a property may increase risk as well (Fritts et al. 2003, Edge et al. 2011). Depredations occur on both open grazing sites and inside fenced pastures.

In the northern Rocky Mountain and Great Lakes states, calves are more commonly killed than other age groups of cattle because of their greater vulnerability (Fritts et al. 2003, Bangs et al. 2005a, Unsworth et al. 2005, Sime et al. 2007, Stone et al. 2008, Ruid et al. 2009, Edge et al. 2011; J. Timberlake, pers. comm.). Oakleaf et al. (2003) found that wolves tend to choose the smallest calves and there is evidence that some depredated calves are in poorer physical condition (Bradley and Pletscher 2005). In parts of Canada, wolves sometimes kill yearling cattle more often than calves (Stone et al. 2008). In contrast, adult sheep appear to be taken more frequently than lambs (Fritts et al. 2003). Depredations commonly involve multiple sheep per incident, whereas only 1-2 cattle are usually killed per incident (Muhly and Musiani 2009).

Among northern Rocky Mountain and Great Lakes states, significant variation exists in the number of cattle and sheep killed by wolves, and sometimes variation exists between years (Tables 5, 6). It is important to note that the numbers presented in Tables 5 and 6 represent minimum estimates of the livestock actually killed by wolves. Probable losses, in which officials are unable to verify the cause

Table 5. Confirmed livestock and dog losses from wolf predation in Idaho, Montana, and Wyoming, 1987-2010 (USFWS et al. 2011)<sup>a,b</sup>.

	87-90	91-94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	Total
<u>Idaho</u>																			
Cattle			0	1	1	9	11	15	10	9	6	19	20	29	53	96	75	75	429
Sheep			0	24	29	5	64	48	54	15	118	161	184	205	170	218	324	148	1,767
Other <sup>c</sup>			0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	3	5
Dogs			0	1	4	1	7	0	2	4	5	3	9	4	8	12	13	0	73
Total wolves <sup>d</sup>			14	42	71	114	156	187	251	263	345	422	512	673	732	846	843	705	-
Wolves killed <sup>e</sup>			0	1	1	0	3	11	7	14	7	17	27	45	50	108	93	78	462
<u>Montana</u>																			
Cattle	14	9	3	10	19	10	20	14	12	20	24	36	23	32	75	77	97	87	582
Sheep	10	2	0	13	41	0	25	7	50	84	86	91	33	4	27	111	202	64	850
Other <sup>c</sup>	0	0	0	0	0	0	0	0	4	5	0	3	2	2	14	16	6	11	63
Dogs	1	0	4	1	0	1	2	5	2	5	1	4	1	4	3	2	4	2	42
Total wolves <sup>d</sup>	10-33	29-55	66	70	56	49	74	97	123	183	182	152	256	316	422	497	524	566	-
Wolves killed <sup>e</sup>	6	0	0	5	18	4	19	7	8	26	34	40	35	53	73	110	145	141	724
<u>Wyoming</u>																			
Cattle			0	0	2	2	2	3	18	23	34	75	54	123	55	41	20	26	478
Sheep			0	0	56	7	0	25	34	0	7	18	27	38	16	26	195	33	482
Other <sup>c</sup>			0	0	0	0	1	0	0	0	10	2	0	1	0	0	0	1	15
Dogs			0	0	0	3	6	6	2	0	0	2	1	0	2	0	7	0	29
Total wolves <sup>d</sup>			21	40	86	112	107	153	189	217	234	272	252	311	359	302	320	343	-
Wolves killed <sup>e</sup>			0	0	2	3	1	2	4	6	18	29	41	44	63	46	32	40	331
<u>Totals</u>																			
Cattle	14	9	3	11	22	21	33	32	40	52	64	130	97	184	183	214	192	188	1,489
Sheep	10	2	0	37	126	12	89	80	138	99	211	270	244	247	213	355	721	245	3,099
Other <sup>c</sup>	0	0	0	0	0	0	1	0	4	5	10	5	2	3	14	17	7	15	83
Dogs	1	0	4	2	4	5	15	11	6	9	6	9	11	8	13	14	24	2	144
Total wolves <sup>d</sup>	10-33	29-55	101	152	213	275	337	437	563	663	761	846	1,020	1,300	1,513	1,645	1,687	1,614	-
Wolves killed <sup>e</sup>	6	0	0	6	21	7	23	20	19	46	59	86	103	142	186	264	270	259	1,517

<sup>a</sup> Confirmed losses are defined as those losses verified through physical evidence to have been caused by wolves, as determined by USDA Wildlife Services or the U.S. Fish and Wildlife Service.

<sup>b</sup> For a variety of reasons (see text), the figures presented here represent minimum estimates of the livestock actually killed by wolves.

<sup>c</sup> Includes livestock other than cattle and sheep. Losses from 1987-2010 totaled 37 goats, 27 llamas, 18 horses, and 1 domestic bison.

<sup>d</sup> Minimum number of wolves living in the state(s) during autumn.

<sup>e</sup> Includes wolves killed by government control actions and those legally killed by ranchers.

Table 6. Confirmed livestock and dog losses from wolf predation in Minnesota, Wisconsin, and Michigan during even-numbered years from 1980-2008 (Erb 2008, Hart 2008, Wydeven et al. 2008, 2009b, 2009d, 2009e, Ruid et al. 2009)<sup>a</sup>.

	80	82	84	86	88	90	92	94	96	98	00	02	04	06	08	Total <sup>b</sup>
<u>Minnesota</u>																
Cattle	16	24	10	26	31	37	55	82	74	118	95	97	66	85	52	1,694
Sheep	56	12	92	13	68	112	38	14	21	33	19	58	15	17	22	1,036
Horses	1	0	1	0	0	0	2	1	1	4	1	2	3	1	0	26
Dogs	1	2	6	1	3	11	5	8	10	25	17	6	4	2	2	194
Total wolves <sup>c</sup>	1,269	1,341	1,416	1,496	1,581	1,700	1,862	2,039	2,232	2,445	2,623	2,814	3,020	3,200	2921	
Wolves killed	21	20	36	31	59	91	118	172	154	161	148	146	105	122	143	2,932
<u>Wisconsin</u>																
Cattle	1	0	0	0	1	0	1	0	0	20	6	36	29	35	39	294
Sheep	0	0	0	0	1	0	8	0	0	0	0	7	5	6	1	55
Horses	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	6
Dogs	0	0	0	1	0	0	2	2	5	10	5	10	15	25	22	158
Total wolves <sup>d</sup>	25	23	18	15	26	34	45	54	99	178	248	327	373	467	626	
Wolves killed	0	0	0	0	0	0	0	0	0	0	0	0	24	18	39	169
<u>Michigan</u>																
Cattle						0	0	0	0	3	2	4	7	9	13	72
Sheep						0	0	0	0	0	1	0	3	4	0	24
Horses						0	0	0	0	0	0	0	0	0	0	0
Dogs						0	0	0	1	0	0	4	4	4	0	33
Total wolves <sup>d</sup>						10	21	57	116	140	216	278	360	434	520	
Wolves killed						0	0	0	0	0	0	0	6	7	8	44
<u>Totals</u>																
Cattle	17	24	10	26	32	37	56	82	74	141	103	137	102	129	104	2,060
Sheep	56	12	92	13	69	112	46	14	21	33	20	65	23	27	23	1,115
Horses	1	0	1	0	0	0	2	1	1	4	1	4	3	1	0	32
Dogs	1	2	6	2	3	11	7	10	16	35	22	20	23	31	24	385
Total wolves	1,294	1,364	1,434	1,511	1,607	1,744	1,928	2,150	2,447	2,763	3,087	3,419	3,753	4,101	4,067	
Wolves killed	21	20	36	31	59	91	118	172	154	161	148	146	135	147	190	3,145

<sup>a</sup> Excludes poultry losses.

<sup>b</sup> Total losses for all years from 1976 to 2008.

<sup>c</sup> Interpolated population estimates based on average population growth between actual population estimations in mid- to late winter.

<sup>d</sup> Minimum number of wolves in mid to late winter based on actual counts or population estimations.

of death, are not included. Additionally, ranchers sometimes fail to locate carcasses or are unable to notify authorities soon enough to obtain confirmation because of the rugged and vast terrain where livestock graze, the extent of carcass consumption by predators and scavengers, or carcass decomposition. In some instances, ranchers may choose not to report their losses.

Determination of the ratio of estimated total losses to confirmed kills continues to be debated (Kroeger et al. 2006) and some wolf experts believe it is premature to set such ratios (C. Sime, pers. comm.). Loss ratios probably vary considerably according to the characteristics of each grazing site, extent of rancher supervision, and type, age, and number of livestock. Loss ratios of 8:1 and 6.3:1 have been reported for cattle in two studies conducted on large allotments with forested and mountainous terrain (one with range riders and one without) (Oakleaf et al. 2003, Sommers et al. 2010). However, Oakleaf et al. (2003) suggested that a ratio of about 2:1 was more realistic under less timbered or less rugged conditions. Loss ratios closer to 1:1 probably occur for many smaller operations using private lands, where livestock are more closely supervised. Morehouse and Boyce (2011) described three wolf packs that depredated cattle more often than recognized by their owners at a site in Alberta.

#### Livestock losses to other causes

While the number of livestock killed by wolves in Idaho, Montana, and Wyoming has generally increased over time as wolf numbers have grown, these are small compared to losses caused by coyotes, cougars, bobcats, dogs, bears, foxes, eagles, and other predators. Coyotes and other predators were responsible for almost all of the losses in which the predator was identified (98.8% of the cattle losses and 99.4% of the sheep losses) during 2004 and 2005; wolves were responsible for 1.8% and 0.6% of the losses (Figure 12). Most of these predators, such as coyotes, cougars, bobcats, black bears, and foxes, can be legally hunted or are subject to lethal control if depredating. Wolf depredations are also far smaller than combined non-predator losses (e.g., sickness, disease, weather, and birthing problems) in Idaho, Montana, and Wyoming, being less than 0.1% of these losses for cattle and 0.6% for sheep (Figure 12; NASS 2005, 2006). Wolves have caused minor losses of other livestock species in these states (Table 5).

### **B. Management Tools for Reducing Wolf Depredation**

Managing wolf-livestock conflicts and wolf recovery requires an integrated approach using a variety of non-lethal and lethal methods, as described below. One of the important factors in reducing wolf-livestock conflicts in the northern Rocky Mountain states was maintaining a high level of radio-collared wolves in the population while the species was listed, which allows agencies to monitor problem situations (Bangs et al. 2006).

#### Proactive Measures

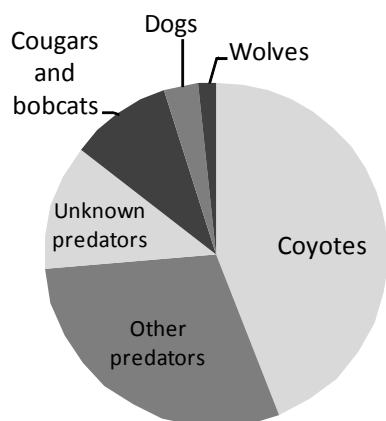
A variety of proactive management measures exist to help livestock producers reduce conflicts between wolves and livestock, and offer a partial alternative to lethal control of wolves (Musiani et al. 2003, Bangs et al. 2005a, 2006, Shivik 2006, Stone et al. 2008). Implementation of such measures may be costly to producers, but there have been efforts in the northern Rocky Mountain states to assist ranchers with proactive measures and to offset some costs. These measures can be especially

important when wolf numbers and distribution are small and recovery objectives have not yet been achieved.

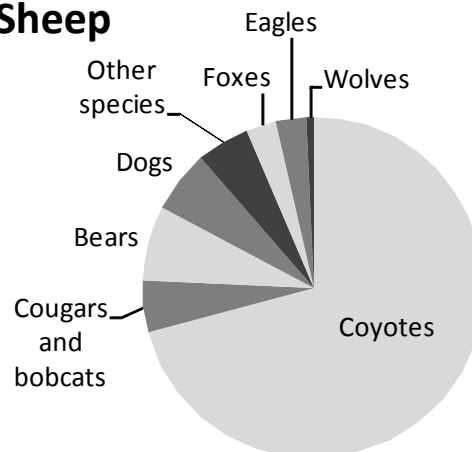
Proactive deterrents, especially when used in combination, often temporarily succeed in reducing the vulnerability of livestock to wolf depredation, but are usually not considered permanent solutions by

### Livestock losses from predators

#### Cattle

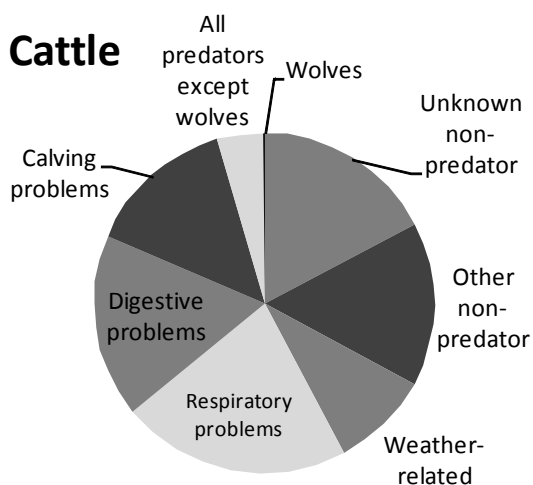


#### Sheep



### Livestock losses from all causes

#### Cattle



#### Sheep

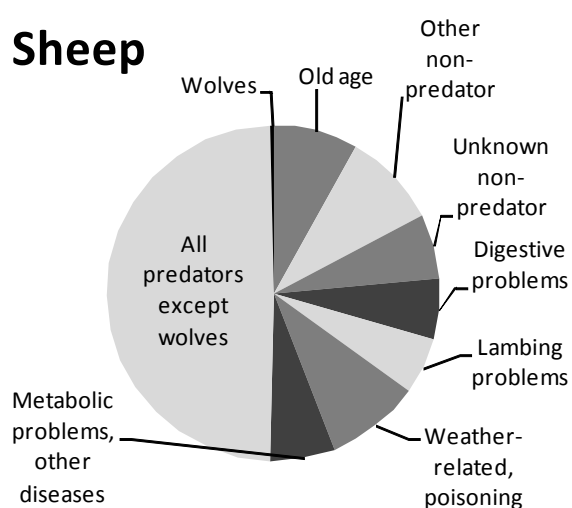


Figure 12. Percent of livestock death losses due to predators and other causes in Idaho, Montana, and Wyoming combined (adapted from NASS 2005, 2006). Data for cattle were collected in 2005 and for sheep in 2004.

themselves. However, when combined with a fair and effective compensation program, they offer the best solution for both limiting livestock losses and compensating producers for any unavoidable losses. Some producers in Washington already use proactive deterrents to protect their livestock from predators. Among producers using such measures in 2004-2005, the most frequently employed tools were exclusion fencing, guarding animals, frequent checking of stock, night penning, and use of lamb sheds (Table 7). Because the large majority of the state's cattle and sheep operations are categorized as extra small or small in the numbers of animals owned (Chapter 14, Section B), implementation of proactive deterrents to protect against wolves may be particularly effective in Washington.

#### *Modified Husbandry Techniques*

Bangs et al. (2006) and Stone et al. (2008) described a number of husbandry methods that are often useful in avoiding some wolf depredation of livestock. These include: the use of range riders to help keep cattle more concentrated on grazing sites; having herders with dogs present with sheep at night when most sheep depredation occurs; burying livestock carcasses rather than dumping them in traditional bone yards to reduce scavenging opportunities by wolves (see Morehouse and Boyce 2011); moving sick or injured livestock, which may be more vulnerable to wolves; delaying the turnout of cattle onto grazing sites until calving is finished or until young wild ungulates are born to reduce opportunities for depredation; allowing calves to reach at least 200 pounds before turning them out to grazing sites can also lower their vulnerability (Oakleaf et al. 2003); and avoiding grazing livestock near wolf territory core areas, especially dens and rendezvous sites, during the earlier portion of the grazing season. Implementation of these methods may result in higher costs to livestock producers.

One type of proactive program that has been developed and tested in Montana is the Range Riders Project. This program is a collaborative effort between ranchers, government agencies, and

Table 7. Percent use of different proactive methods among ranchers and farmers employing such techniques to prevent predation losses of livestock in Washington (NASS 2005, 2006).

Method	Cattle and calves (% of use) <sup>a</sup>	Sheep and lambs (% of use) <sup>a</sup>
Exclusion fencing	48.1	68.5
Guard animals	43.8	25.0
Frequent checks	43.1	2.5
Culling	14.1	4.0
Livestock carcass removal	13.6	1.0
Fright tactics	4.2	2.0
Night penning	0.2	36.6
Lamb shed	-	35.4
Llamas	-	16.4
Donkeys	-	6.7
Herding	-	2.4
Change bedding	-	0.1
Other methods	13.7	2.0

<sup>a</sup> Data for cattle and calves are from 2005, data for sheep and lambs are from 2004.

conservationists (including the Montana Fish, Wildlife & Parks, Madison Valley Ranchlands Group, Boulder Watershed Association, Turner Endangered Species Fund, USDA Forest Service, Predator Conservation Alliance, the Sun Ranch, USDA Wildlife Services, USDA Natural Resources and Conservation Service, Sweet Grass County Conservation District, and Montana State University Extension Service). The main goal of the project is to reduce predator-livestock interactions. Secondary goals are to (1) detect injured or dead livestock more rapidly, (2) preserve the evidence at potential depredation sites so that investigators can better determine whether or not predation was involved and which species was responsible, (3) improve livestock management and range conditions, (4) increase knowledge about predator-livestock interactions in space and time, and (5) build relationships among project partners. All project collaborators provide funding and in-kind contributions. In particular, significant funding has come through the USDA Natural Resources and Conservation Service's Environmental Quality Incentives Program.

In the Range Riders Project, cowhands are trained in methods to keep wolves and livestock apart. Riders stay with livestock throughout the grazing season (generally June–October) and chase away any wolves that come near the cattle. Projects were implemented beginning in 2004 on both public grazing allotments and private lands in two valleys in Montana. Protocols varied from place to place, but the underlying premise was continual human presence and immediate response to wolves interacting with livestock. The use of horses and vehicles (where applicable) allowed riders to cover as much ground as possible while checking on livestock. In 2006, areas with riders experienced no confirmed or probable depredations, although wolves were present and were seen and/or chased off. Due to high variability among sites, there is no clear evidence that these efforts have actually prevented depredations. However, when surveyed, many participating producers believed the project was helpful and indicated an interest to continue their participation. Additional range rider projects implemented in Montana are briefly described in USFWS et al. (2009).

#### *Non-Lethal Deterrents*

A number of non-lethal deterrents have been developed for discouraging wolf predation on livestock, including those developed in the northern Rocky Mountain states (Bangs et al. 2005a, 2006, Shivik 2006, Stone et al. 2008, Gehring et al. 2010a, Urbigkit and Urbigkit 2010). These deterrents are available to livestock producers and are generally most effective in small areas. The following non-lethal deterrents have been used:

- Guarding animals (primarily dogs) that are kept with livestock and alert herders when wolves and other predators are nearby.
- Light and noise scare devices that are used to frighten wolves away from confined livestock and alert ranchers and herders to the presence of wolves. These include propane cannons, light systems, and radio-activated guard (RAG) systems that emit flashing lights and loud sounds at the approach of a radio-collared wolf.
- Hazing with non-lethal munitions (e.g., cracker shells, rubber bullets, paintballs, and bean bags) to frighten wolves seen near livestock.
- Predator-resistant or electric fencing that is used as a permanent or temporary barrier to confine livestock and keep wolves away. Portable fencing can be effective as night pens under open grazing conditions.
- Fladry, which consists of numerous strips of flagging hung along a fence or rope to keep wolves out of an area occupied by livestock. Electrified fladry ("turbofladry") is similar, but

with the flagging hung from an electrified wire. Initial testing suggests that electrified fladry is more effective with wolves than regular fladry (Lance et al. 2010).

Further research and development may eventually produce other suitable techniques that can be implemented under field conditions (e.g., “biofencing” using human-distributed wolf scat and urine, Ausband 2010; shock collars, Hawley et al. 2009; and greater integration of guarding dogs, Gehring et al. 2010b, Urbigkit and Urbigkit 2010).

#### *Moving Individual Wolves to Resolve Conflicts*

Relocation was used extensively by the U.S. Fish and Wildlife Service as a non-lethal solution to mitigate livestock damage in the early phases of wolf recovery in the northern Rocky Mountain and Great Lakes states, but gradually became less practical as the number of potential release sites declined with expansion of the regions’ wolf populations (Bangs et al. 1998, Bradley et al. 2005, Ruid et al. 2009). Bradley et al.’s (2005) evaluation of the technique in Idaho, Montana, and Wyoming revealed some important drawbacks with its use. These included (1) a lower average annual rate of survival among relocated wolves (60%) than non-relocated wolves (73%), (2) the failure of most (67%) relocated wolves to ever join or form a pack, (3) a strong tendency among relocated wolves to depart their release site, including 20% that returned distances of 46-197 miles to their original capture location, and (4) 18% of relocated wolves that resumed depredation of livestock near their release site. Selection of release sites strongly affected survival of relocated individuals, with survival being greatest in the high quality habitat of central Idaho and lowest in the more human-influenced landscapes of northwestern Montana. Soft releases showed some promise in reducing homing behavior among relocated wolves. Bradley et al. (2005) concluded that moving wolves was most effective during the early stages of population recovery, and that other non-lethal techniques are probably better for preventing or resolving conflicts when larger wolf populations exist.

In Minnesota, wolves involved in depredations or harassment of livestock were relocated to areas of suitable wolf habitat from 1975-1978. Survival and behavior of relocated adults and pups were comparable to resident wolves, and similar to that of naturally dispersing wolves (Fritts et al. 1985). Most relocated wolves left their release sites within a few days and were more likely to return to their original capture sites if moved less than 40 miles (Fritts et al. 1984). Resident wolves were present at release sites, which may explain the rapid departure of relocated wolves from release sites.

#### Lethal Removal

Lethal control of wolves may be necessary to resolve repeated wolf-livestock conflicts and is performed to remove problem animals that jeopardize public tolerance for overall wolf recovery. Large numbers of wolves have been killed in control actions in both the northern Rocky Mountain states (1,517 wolves from 1987 to 2010, with 7-16% of the population removed annually since 2002; Table 5) and Great Lakes states (3,145 wolves from 1978 to 2008, with 3-4% of the population removed annually; Table 6) during the recovery of wolf populations. While federally listed, most lethal control of wolves in the northern Rocky Mountain states was performed by wildlife agency staff. As wolves became more common, the U.S. Fish and Wildlife Service gradually loosened restrictions on this activity to allow increased take by agency staff and private citizens with a federal permit (Fritts et al. 1992, Bangs et al. 2006). In Washington, if wolves are federally listed in any part

of the state, WDFW would consult with and coordinate with the U.S. Fish and Wildlife Service prior to any lethal removal proposal to ensure consistency with federal law.

In Idaho, Montana, and Wyoming, agency decisions to lethally remove wolves have been made on a case-by-case basis, taking into account specific factors such as a pack's size and conflict history, status and distribution of natural prey in the area, season, age and class of livestock, success or failure of non-lethal tools, and potential for future losses (Sime et al. 2007). Where lethal removal is deemed necessary, incremental control is usually attempted, with one or two offending animals removed initially. If depredations continue, additional animals may be killed. Stepwise incremental control can result in the eventual elimination of entire packs if wolves repeatedly depredate livestock (Sime et al. 2007).

Lethal control of wolves by agency staff can have the advantages of being swift, effective, and tightly regulated. The benefits of allowing lethal removal by livestock producers are that offending wolves are more likely to be targeted, it can eliminate the need for agency control, shooting at wolves may teach them and other pack members to be more wary of humans and to avoid areas of high human activity, it allows producers to address their own problems, and it may reduce animosity toward government agencies and personnel (Bangs et al. 2006). Drawbacks of lethal control are that it is always controversial among a sizeable segment of the public, depredation may recur, there is uncertainty whether the wolves killed were the offending animals, wolves may respond by becoming more active at night to avoid people, it can be costly when performed by agencies, and it is open to abuse when conducted by the public, thereby requiring law enforcement follow-up (Fritts et al. 1992, Musiani et al. 2005, Treves and Naughton-Treves 2005, Bangs et al. 2006). Two recent analyses of long-term lethal control of wolves found that removals generally have limited or no effect in reducing the recurrence of depredation (Harper et al. 2008, Muhly et al. 2010a).

Although lethal control is a necessary tool for reducing wolf depredation on livestock, excessive levels of lethal removal can preclude the recovery of wolf populations, as noted with the Mexican gray wolf in New Mexico and Arizona (USFWS 2005). Wolf managers must therefore monitor and, if necessary, adjust the extent of lethal removals to meet both conservation and management objectives. Constraints on lethal control have recently been recommended by Brainerd et al. (2008) to minimize negative impacts on recolonizing wolf populations. They suggested that lethal control be limited to solitary individuals or territorial pairs whenever possible, and that removals from reproductive packs should occur when pups are more than six months old, the packs contain six or more members (including three or more adults or yearlings), neighboring packs exist nearby, and the population totals 75 or more wolves. Consideration should also be given to minimizing lethal control around or between any core recovery areas that are eventually identified, especially during denning and pup rearing periods (April to September) (E. Bangs, pers. comm.). Additionally, managers should assess the potential negative impacts of wolf removal on pack structure and persistence and the potential for creating unstable pack dynamics if sink habitats are created by depredation control, especially in recovering populations (Gehring et al. 2003).

### **C. Compensation Programs for Wolf-Related Losses and Deterrence in Other States**

Some livestock producers experience financial losses due to wolves, particularly through depredations on livestock. Other financial hardships associated with wolves may result from livestock becoming stressed or injured, and from changes in husbandry or management methods to

1 reduce risk of depredation (see Chapter 14, Section B). Some of these losses can be documented  
2 reliably but others cannot. Wolf compensation programs were started as a means to build greater  
3 social acceptance for wolf recovery by reimbursing producers for some of these losses while wolves  
4 were listed.

#### 6 Compensation for Losses

8 Defenders of Wildlife devised and operated the first compensation program for wolf depredation in  
9 the western United States (Stone 2009). Known as the Bailey Wildlife Foundation Wolf  
10 Compensation Trust, it paid about \$1.5 million to livestock operators in Idaho, Montana, and  
11 Wyoming from 1987 to August 2010 (S. Stone, pers. comm.), with all funding obtained from private  
12 sources. Confirmed losses of livestock and herding/guarding dogs were reimbursed at 100% of  
13 their current or projected market value up to \$3,000 per animal, whereas probable losses were  
14 reimbursed at 50% of their current or projected market value up to \$1,500 per animal. Producers  
15 seeking compensation were required to provide appropriate documentation of the value of their  
16 animal(s), such as a contract, previous sale record, or current market reports, and had to submit a  
17 standard investigation report. Claims were paid on average within two and a half months (Muhly  
18 and Musiani 2010). To remain eligible for compensation of future losses, livestock owners needed  
19 to demonstrate reasonable use of non-lethal control measures and animal husbandry methods that  
20 did not unnecessarily attract wolves.

22 The Defenders of Wildlife program ended in all states except Oregon in 2010. In 2010, much of the  
23 funding for state-operated compensation programs came from a federal grant, the 2009 Wolf Loss  
24 Demonstration Project Bill, Public Law 111-11 (USFWS et al. 2011). This law provided up to \$1  
25 million annually for five years to states (excluding Alaska) and tribes with wolves and wolf-caused  
26 livestock damage. States are required to provide a 50% match for the federal contribution with state  
27 funds or private donations. In 2010, Defenders of Wildlife and state-run programs paid out  
28 \$270,263 in Idaho, \$96,097 in Montana, and \$82,186 in Wyoming (USFWS et al. 2011).  
29 Descriptions of various state compensation programs are provided below.

31 The Idaho Wolf Depredation Compensation Program is overseen by a board of county  
32 commissioners, with agency representatives acting as advisors (OSC 2011). Since its inception in  
33 2001, Idaho's program has paid claims for some wolf damage not covered by the Defenders of  
34 Wildlife compensation program (USFWS et al. 2010). Claims for verified losses receive priority and  
35 are paid at market value. Payments for unverified losses (e.g., lower than expected weight gains by  
36 livestock) and missing livestock are allocated on a prorated basis. If funds remain, reimbursement is  
37 also given for proactive measures. The Idaho program is funded at up to \$100,000/year using  
38 federal funding. If claims exceed \$100,000/year, each claim is pro-rated a percentage of the  
39 available \$100,000 available (USFWS et al. 2010). The state compensation program recognized  
40 claims of \$220,000 in 2008, \$208,000 in 2009, and \$280,000 in 2010 (USFWS et al. 2009, 2010,  
41 2011).

43 Montana's state compensation program was created by the state legislature in 2007. The Montana  
44 Livestock Loss Board oversees the state's compensation program consistent with the Montana wolf  
45 plan (MDOL 2011). The board makes payments for confirmed and probable livestock losses its  
46 first priority, but had insufficient funding in 2010 to cover injured livestock and costs associated  
47 with proactive efforts. A grant program for prevention costs is being initiated in 2011. Overall

1 funding comes from federal and state appropriations and private donors (e.g., Defenders of Wildlife,  
2 Montana Cattlemen's Association, Montana Farmers Union, and online contributions by private  
3 citizens). In addition, a specialty license plate will be issued to generate additional funding. The  
4 state compensation program paid claims of \$87,318 in 2008 (April 15 to December 31), \$144,996 in  
5 2009, and \$96,076 in 2010 (USFWS et al. 2009, 2010, 2011).  
6

7 Wyoming's compensation program was created in 2008 using state general fund dollars (USFWS et  
8 al. 2010). Under Wyoming's compensation program, damage claims are paid only in the "trophy  
9 game" area of northwestern Wyoming (USFWS et al. 2011). The program uses a multiplier for each  
10 confirmed depredation on calves and sheep to account for undocumented wolf-caused losses.  
11 Calves and sheep are compensated up to seven times the number confirmed but only up to the total  
12 number reported missing by a producer. Other kinds of livestock such as adult cattle and horses are  
13 covered at actual value for confirmed losses only. Wyoming's compensation program paid claims of  
14 \$101,429 in 2008 (July through December), \$67,581 in 2009, and \$73,849 in 2010 (USFWS et al.  
15 2009, 2010, 2011).  
16

17 Each of the Great Lakes states with wolves operates its own wolf compensation program.  
18 Wisconsin's program is run with federal and state matching funds. The latter come in part from  
19 voluntary public contributions, which can be made through (1) the purchase of Endangered  
20 Resources vehicle license plates bearing a wolf logo), (2) a check-off on the state income tax form  
21 (Treves 2008), and (3) the Wisconsin Department of Natural Resources' webpage. The program  
22 covers livestock (including calves missing at greater than normal mortality rates), hunting and pet  
23 dogs killed or injured on public lands, and farmed deer. Payments for dogs represented slightly  
24 more than half of the \$92,000 paid out in compensation in 2009 (Wydeven et al. 2010). Minnesota's  
25 program compensates only for livestock killed or injured, as confirmed by university extension  
26 agents, conservation officers, or USDA Wildlife Services (Ruid et al. 2009). Husbandry practices  
27 must not have contributed to wolf depredations. Michigan's program similarly pays only for  
28 livestock losses verified by state Department of Natural Resources personnel or USDA Wildlife  
29 Services (Ruid et al. 2009). Funding comes from the state legislature and private sources. Between  
30 1996 and 2009, \$40,270 was paid out to livestock owners in Michigan for compensation of losses  
31 that were confirmed and attributed to wolves (Edge et al. 2011).  
32

33 Compensation for wolf depredation is also available in all states through the federal Emergency  
34 Assistance for Livestock, Honey Bees, and Farm-Raised Fish Program (ELAP), which was created  
35 as part of the 2008 Farm Bill and is administered by the USDA Farm Service Agency. Payments for  
36 confirmed wolf kills (probable kills are not covered) are based on 75% of the fair market value of  
37 the animal lost. Value for each class of livestock is determined annually according to prices at the  
38 time. A single rate applies to all losses of that class of animal across the U.S., regardless of the value  
39 the producer may feel a specific animal had. Reimbursement is given only for losses beyond normal  
40 mortality, and thus is not paid until the year is over. Livestock producers are only eligible if they  
41 insure all crops they raise, including pasture, thus many may not qualify for coverage. Claims must  
42 be submitted within 30 days on an incident and verified by a competent authority (e.g., USDA  
43 Wildlife Services, state fish and wildlife agency). Claims reimbursed through other compensation  
44 programs are not eligible. ELAP is only authorized through September 30, 2011, unless  
45 Congressional action extends it until 2012. Thus far, the program has been used minimally in the  
46 northern Rocky Mountain states to compensate livestock producers for wolf damage.  
47

Evaluations of the effectiveness of wolf compensation programs have been conducted in the U.S. and other countries. Stone (2009) reported that most (69%) recipients of compensation from the Defenders of Wildlife program in the northern Rocky Mountain states were somewhat or highly satisfied with the payments they received and most (80%) did not want to see a reimbursement program ended. Nevertheless, the majority of (60%) recipients stated that the payments did not increase their support for wolf recovery, causing Stone (2009) to conclude that the program succeeded only in preventing further loss of tolerance for wolves among livestock producers. Program evaluations elsewhere have similarly concluded that compensation generally fails to improve the attitudes of producers towards wolves (Naughton-Treves et al. 2003, Treves et al. 2009, Vynne 2009, Boitani et al. 2010). This has led to recommendations for revision of existing compensation programs, including making them more user friendly and involving stakeholders (both recipients and donors) in program development and management.

#### Compensation for Proactive Management

With the termination of its compensation fund in 2010, Defenders of Wildlife is expanding its Proactive Carnivore Conservation Fund, which encourages greater use of preventative non-lethal deterrents and appropriate husbandry methods through cost-sharing grants to ranchers. This program spent \$376,000 on wolf-related projects in the northern Rocky Mountain states from 1999 to 2010 (S. Stone, pers. comm.).

#### **D. Predicting Losses of Ranch Animals in Washington Due to Wolves**

This section provides rough estimates of confirmable losses of ranch animals that might be expected to occur annually in Washington as wolves become reestablished. Hypothetical projections are given for four population size categories of 50, 100, 200, and 300 wolves (which corresponds to about 4, 7, 14, and 21 breeding packs, respectively, USFWS 2009). Predictions of this type are difficult because of the many uncertainties over where and how many wolves will eventually inhabit the state, the frequency that they will interact with livestock, problems in determining actual versus confirmed numbers of livestock killed, and ongoing improvements in the adaptive management responses of ranchers and wildlife agencies.

The estimates presented are based on analyses of depredation data from Idaho, Montana, and Wyoming for 1987 to 2007 (Table 5) and assume that interactions between livestock and wolves in Washington will be similar to those in these states. This assumption must be viewed cautiously because of differences in livestock numbers (especially the lower number of sheep in Washington) and distribution, husbandry methods, availability of natural prey, land use, and human densities. In addition, these projections represent average expected losses per year and do not demonstrate the annual variation in depredations that commonly occurs in Idaho, Montana, and Wyoming. More complete information on this analysis and the annual monetary value of these losses appear in Chapter 14, Section B.

Low and high predictions of confirmable annual losses of ranch animals for Washington are presented in Table 8. Total populations of 50 and 100 wolves are expected to depredate very small numbers of livestock. Fifty wolves may kill about 1-6 cattle and 7-16 sheep per year, with annual take perhaps doubling for 100 wolves. Larger wolf populations will likely kill greater numbers of livestock, with projections of 6-28 cattle and 20-60 sheep killed annually by 200 wolves, and 12-67

Table 8. Predicted estimates of confirmable depredations of livestock and domestic dogs for four different future population size categories of wolves in Washington. Because of the absence of biological and depredation data on wolves living in Washington, numbers presented here should be considered as very rough hypothetical estimates.

	Wolf population size category			
	50	100	200	300
Future number of wolves present	50	100	200	300
Estimated no. of future confirmed cattle depredations per year <sup>a</sup>	1-6	2-12	6-28	12-67
Estimated no. of future confirmed sheep depredations per year <sup>a</sup>	7-16	14-35	20-60	22-92
Estimated no. of future confirmed horse and other livestock depredations per year <sup>a</sup>	0-1	0-1	0-2	0-2
Estimated no. of future confirmed dog depredations per year <sup>a</sup>	1-2	2	2-3	1-4

<sup>a</sup> Numbers represent the estimated numbers of livestock and dogs that might be confirmed as being killed annually by different sizes of wolf populations. Unconfirmed kills are excluded from these estimates.

cattle and 22-92 sheep killed annually if 300 wolves became reestablished. However, sheep losses are expected to be on the low end of these estimates because sheep numbers are much smaller in Washington than in Idaho, Montana, and Wyoming (see NASS 2004). Even at a population of 300 wolves, these levels of depredations represent 4% or less of the annual predator-caused death losses experienced by Washington cattle and sheep producers. Depredations on horses, other livestock, and guarding/herding dogs are expected to be minor for each of the four wolf population size categories.

## E. Management of Wolf-Livestock Conflicts in Washington

Any wolf-livestock management program should manage conflicts in a way that gives livestock owners experiencing losses the tools to minimize losses, while at the same time not harming the recovery or long-term sustainability of wolf populations. Strategies to address wolf-livestock conflicts in Washington are described in Chapter 12, Task 4. Management approaches are based on the status of wolves, ensuring that recovery objectives are met. Non-lethal management techniques will be emphasized throughout the recovery period and beyond. Actively informing and equipping landowners, livestock producers, and the public with tools to implement proactive wolf management techniques will be an important aspect of this approach. Lethal control will be used only as needed after case-specific evaluations are made, with use becoming less restrictive as wolves progress toward delisting. Wherever wolves are federally listed in Washington, the U.S. Fish and Wildlife Service and USDA Wildlife Services are the lead agencies to respond to reports of wolf depredations. WDFW will consult with and collaborate with the U.S. Fish and Wildlife Service on management decisions and actions in these locations. In areas where wolves are federally delisted, WDFW will be the lead to respond, with potential assistance from USDA Wildlife Services and other entities (Chapter 12, Task 4.3.3).

Wolf-livestock conflicts will be managed using a range of options to prevent depredation, as presented in Table 9. Descriptions of these options are as follows:

Table 9. State management options to address depredation of livestock during wolf recovery phases in Washington. All proposed state management actions involving lethal control of wolves in areas of Washington where the species is federally listed would be contingent on consistency with federal law and consultation and approval by the U.S. Fish and Wildlife Service.

Management Option	Endangered	Threatened	Sensitive
Wolf location information to livestock owners	Provided	Provided	Provided
Non-injurious harassment	Allowed	Allowed	Allowed
Non-lethal injurious harassment	Allowed with a permit and training from WDFW. This will be reconsidered if used inappropriately or a mortality occurs under this provision	Allowed with a permit and training from WDFW	Allowed with a permit and training from WDFW
Move individual wolves	May be used by state/federal agents to resolve conflicts on a case-by-case basis	May be used by state/federal agents to resolve conflicts on a case-by-case basis	May be used by state/federal agents to resolve conflicts on a case-by-case basis
Lethal control of wolves to resolve repeated wolf-livestock conflicts	Allowed by state/federal agents on a case-by-case basis. WDFW may consider issuing a permit to a livestock owner to conduct lethal control on private land they own or lease if WDFW does not have the resources to address control	Allowed by state/federal agents on a case-by-case basis. WDFW may consider issuing a permit to a livestock owner to conduct lethal control on private land they own or lease if WDFW does not have the resources to address control	Allowed by state/federal agents, and livestock owners (including family members and authorized employees) with an issued permit on private lands and public grazing allotments they own or lease
Lethal take of wolves in the act of attacking (biting, wounding, or killing) livestock, including guarding/herding animals	Allowed by livestock owners (including family members and authorized employees) on private land they own or lease with an issued permit, after documented depredation (injury or killing) in the area and efforts to resolve the problem have been deemed ineffective.  Would trigger a review by WDFW if used inappropriately or if 2 wolf mortalities occur under this provision in a year. WDFW would evaluate the circumstances of the mortalities and determine if it would continue issuing permits.	Allowed by livestock owners (including family members and authorized employees) on private land they own or lease with an issued permit, after documented depredation (injury or killing) in the area and efforts to resolve the problem have been deemed ineffective.  Would trigger a review by WDFW if used inappropriately or if 2 wolf mortalities occur under this provision in a year. WDFW would evaluate the circumstances of the mortalities and determine if it would continue issuing permits.	Allowed by livestock owners (including family members and authorized employees) on private land they own or lease with an issued permit, after documented depredation (injury or killing) in the area and efforts to resolve the problem have been deemed ineffective.  Would trigger a review by WDFW if used inappropriately or if 2 wolf mortalities occur under this provision in a year. WDFW would evaluate the circumstances of the mortalities and determine if it would continue issuing permits.
Compensation	Yes	Yes	Yes

Table 9. State management options to address depredation of livestock during wolf recovery phases in Washington. All proposed state management actions involving lethal control of wolves in areas of Washington where the species is federally listed would be contingent on consistency with federal law and consultation and approval by the U.S. Fish and Wildlife Service.

Management Option	Endangered	Threatened	Sensitive
Assistance with the use of proactive non-lethal management tools	Yes	Yes	Yes

Wolf location information: WDFW will notify livestock producers if wolves are living near their operations and will update them, as needed. This will assist livestock producers in implementing proactive precautions, if they choose, to reduce the likelihood of depredation by wolves.

Non-injurious harassment: Livestock owners and grazing allotment holders (or their designated agents) will be allowed to harass wolves with non-injurious techniques when wolves are in close proximity to livestock or livestock grazing areas on both private and public land. These techniques could include scaring off an animal(s) by firing shots or cracker shells into the air, making loud noises, or other methods of confronting the animal(s) without doing bodily harm.

Non-lethal injurious harassment: This form of harassment involves striking wolves with non-lethal projectiles, such as rubber bullets specifically designed and approved for use on wolves, paintballs, and beanbags (Bangs et al. 2006). Livestock owners and grazing allotment holders (or their designated agents) may be issued a permit to use non-lethal injurious harassment on their own land or their legally designated allotment, respectively, during all listed phases. This will require authorization from WDFW and training in the use of the above listed projectiles. While wolves are listed as endangered, this management tool will be reconsidered if used inappropriately or if a wolf mortality occurs under this provision.

Move individual wolves: As described in Section B of this chapter, moving an individual wolf is a possible management tool to remove the animal from a conflict situation. This activity would be evaluated on a case-specific basis under all management phases, but would especially be considered during endangered and threatened status. Examples of when this might occur are when a wolf or wolves become involved in depredation on livestock, or are present in an area that could result in conflict with humans or harm to the wolf.

If a wolf were moved, it would be transported and released into suitable remote habitat on public land, within the same recovery region. A relocated individual would be released into an area unoccupied by an existing wolf pack; and would not be moved to an area that had livestock present on the ground. Any relocation would be conducted by WDFW or USDA Wildlife Services in consultation with the appropriate land management agency, and the U.S. Fish and Wildlife Service, if wolves are federally listed in that portion of the state. Moving an individual wolf does not require a public review process and is not used to facilitate dispersal.

Lethal control to resolve repeated livestock depredations: Lethal removal may be used to stop repeated depredation if it is documented that livestock have clearly been killed by wolves, non-lethal methods have been tried but failed to resolve the conflict, depredations are likely to continue, and there is no evidence of intentional feeding or unnatural attraction of wolves by the livestock owner. Situations will have to be evaluated on a case-specific basis, with management decisions based on pack history and size, pattern of depredations, number of livestock killed, state listed status of wolves, extent of proactive management measures being used on the property, and other considerations. If it is determined that lethal removal is necessary, it will likely be used incrementally, as has been done in other states, with one or two offending animals removed initially. If depredations continue, additional animals may be removed. Lethal removal methods may include trapping and euthanizing, or shooting.

In areas of Washington where wolves are federally listed, any proposal to lethally control wolves would have to be consistent with federal law. WDFW does not have authority to lethally remove wolves where they are federally listed. During state endangered and threatened status, lethal control would be conducted by WDFW or USDA Wildlife Services staff. If a situation were to occur where WDFW did not have the resources to address a situation of repeated depredations, WDFW may consider issuing a permit to a livestock owner to conduct lethal control during a specific time period on private lands they own or lease. As wolves move to state sensitive and delisted status, WDFW may permit livestock owners (including their family members and authorized employees) to lethally control a limited number of wolves during a specific time period on private lands and public grazing allotments they own or lease. Wolves taken under a permit must be reported to WDFW within 24 hours, with additional reasonable time allowed if there is limited access to the take site.

Lethal take in the act of attacking livestock: This provision allows lethal take of wolves “in the act” of attacking livestock (defined as biting, wounding, or killing; not just chasing or pursuing) by livestock owners, family members, and authorized employees with an issued WDFW permit on private land they own or lease during all state listed statuses. This provision would not be available in areas of the state where wolves are federally listed as endangered. Federal law does not allow lethal take of an endangered species in the act of attacking livestock. At federal threatened status, there is more management flexibility through federal regulations. Wherever wolves are federally listed in Washington, the U.S. Fish and Wildlife Service is the lead management authority. In these areas, WDFW will consult with and collaborate with the U.S. Fish and Wildlife Service on management decisions and actions to ensure consistency with federal law.

State law (RCW 77.15.120) prohibits the killing of an endangered species unless it has been authorized by rule of the commission. Subject to limitations established by the commission, certain private citizens may kill wildlife that is threatening human safety or causing property damage. Under RCW 77.36.030, the conditions set by the commission must include “appropriate protection for threatened or endangered species.” It also states that in establishing the limitations and conditions related to wolves, the commission “shall take into consideration the recommendations of the Washington state wolf conservation and management plan.” Under WAC 232-36-051, it is unlawful to kill state endangered species causing damage to commercial livestock unless authorized by commission rule or WDFW permit.

Permits for this activity would be issued after WDFW has confirmed that wolves previously have wounded or killed livestock in the area and efforts to resolve the problem have been deemed

ineffective. Efforts to resolve the problem may either be preventative measures (i.e., documented non-lethal actions implemented specifically to minimize or avoid wolf-livestock conflict before the initial depredation), or non-lethal control efforts (i.e., non-lethal actions implemented specifically to minimize or avoid wolf-livestock conflict after the initial depredation). The permit holder would be required to continue implementing non-lethal actions to minimize or avoid wolf-livestock conflicts during the life of the permit, with issuance of future permits being contingent upon this effort. “In the area” means the area known to be used by the depredating wolves. In some cases, the area may be specifically delineated by data (i.e., radio telemetry). Permits for this activity may be issued for protection of all types of livestock covered under this plan and to both commercial and non-commercial livestock operators.

WDFW will provide training to permit holders to ensure the appropriate use of this provision. Wolves stalking, looking at, or passing near livestock, present in a field with livestock, or present on private property are not considered to be in of attacking. Wolves may not be intentionally baited, fed, or deliberately attracted for any purpose, including killing under this provision. Wolves killed under this provision must be reported to WDFW within 24 hours, with additional reasonable time allowed if there is limited access to the take site. The wolf carcass must be surrendered to WDFW and preservation of physical evidence from the scene of the attack for inspection by WDFW is required.

During endangered and threatened statuses, if this provision were used inappropriately or if two wolves were killed under it in a year, it would trigger a review by WDFW. A review of this type would evaluate the circumstances of the mortalities or other problems, and would result in a determination of whether WDFW would stop issuing new permits or withdraw existing permits.

## **F. Proactive Measures to Reduce Wolf-Livestock Conflicts in Washington**

Proactive non-lethal tools offer livestock producers different methods for reducing wolf-livestock conflicts and depredations. WDFW will actively encourage and provide technical assistance to livestock producers to implement proactive management techniques. Fewer conflicts could aid wolf conservation by improving social tolerance for the species and could lead to lowered compensation costs over the long-term.

WDFW will work with livestock producers to provide technical assistance on proactive, non-lethal management methods and technologies (Chapter 12, Task 4.2.2). It is recognized that these measures will result in higher costs for livestock producers. Under Task 4.4.6, funding will be sought to assist producers with some of their expenses associated with implementing proactive measures. WDFW will also be open to partnerships with other agencies and organizations (e.g., Defenders of Wildlife through its Proactive Carnivore Conservation Fund) that are interested in providing livestock producers with funding, additional training, and other resources needed to implement these measures.

## **G. Compensation for Wolf-Caused Livestock Depredation in Washington**

Currently, state laws RCW 77.36 and WAC 232-36 allow owners of commercial livestock (cattle, sheep, and horses held or raised by a person for sale) to be compensated by WDFW for animals killed or injured by bears, cougars, and wolves if required conditions are met (Appendix F) and the

State Legislature approves funding for that purpose each biennium. Under these laws, claimants can receive no more than \$200 per sheep, \$1,500 per head of cattle, and \$1,500 per horse up to a \$10,000 limit per claim. Other types of livestock are excluded from coverage. To qualify for compensation, livestock owners must have (1) gross sales of at least \$10,000 during the preceding tax year, (2) a minimum of \$500 in damage, (3) used self-help preventative measures (including non-lethal methods and department-provided materials; some exceptions may apply) prior to the depredation, and (4) exhausted other compensation options from non-profit organizations. Compensation cannot be redundant with payments made by non-profit organizations and will not be paid if the damages are covered by insurance. An appeals process exists for applicants to dispute claim denials or settlement offers. The Legislature has not yet provided funding for this program. WDFW received funding from other sources in 2010 to pay compensation for confirmed and probable losses caused by wolves. This included a \$15,000 grant from the U.S. Fish and Wildlife Service provided under the 2009 Wolf Loss Demonstration Project Bill, Public Law 111-11, and a \$15,000 donation for the required match from Defenders of Wildlife.

#### State Wolf Compensation Program

This plan provides for a state compensation program for documented confirmed and probable wolf-killed livestock in order to reduce the financial losses that some livestock producers might experience while wolves are state listed. Public support for a state-funded wolf compensation program was expressed in the comments received during public meetings in 2007 and 2009 and the plan's public review period in 2009-2010. Many people supporting wolf restoration view compensation as an opportunity to share in the burden that livestock producers may experience and as a way to build public support for wolf recovery (see Montag et al. 2003). An effective compensation program supported by the public and Legislature can also help maintain tolerance for wolves among some landowners and livestock producers (Bangs et al. 2006, Stone 2009), which can help decrease illegal killings and aid wolf recovery.

#### *Payment for Confirmed and Probable Depredations on Livestock*

The plan expands compensation for wolf depredation beyond that currently provided for by the state in RCW 77.36 and WAC 232-36 (Appendix F). Under this plan, livestock eligible for compensation include cattle, sheep, horses, pigs, mules, llamas, goats, and guarding/herding animals. All livestock owners would be eligible, regardless of gross sales level during the preceding tax year. Domestic pets and hunting dogs would not be covered for compensation; however, dogs used for animal control efforts under contract with WDFW or other public entities may be eligible. The WDFW plans to seek funding through other partners to address the expanded compensation provisions.

To receive compensation, producers will be responsible for following appropriate management methods that seek to limit wolf attractants in the vicinity of their livestock, including removal of dead and dying animals and other proactive measures. Producers who have already been compensated for a depredation would be required to demonstrate that they are implementing appropriate management methods to be eligible for compensation for subsequent depredation occurrences.

To receive compensation for direct losses, incidences of suspected wolf depredation must be reported to WDFW and verified as confirmed or probable (as defined below) during a follow-up investigation conducted by trained personnel authorized by WDFW. If wolves are federally listed, the U.S. Fish and Wildlife Service and USDA Wildlife Services will respond to depredation reports. Prompt investigations are critical for determining the validity of reported complaints, and livestock producers need to report suspected wolf depredations as soon as possible (see Appendix K for reporting guidelines and associated information). Agency personnel will conduct their investigation within 48 hours of receiving a report. After an investigation is completed, the complaint will be classified under one of the following categories:

- Confirmed Wolf Depredation – There is reasonable physical evidence that the dead or injured animal was actually attacked or killed by a wolf. Primary confirmation would ordinarily be the presence of bite marks and associated subcutaneous hemorrhaging and tissue damage, indicating that the attack occurred while the victim was alive, as opposed to simply feeding on an already dead animal. Spacing between canine tooth punctures, feeding pattern on the carcass, fresh tracks, scat, hairs rubbed off on fences or brush, and/or eyewitness accounts of the attack may help identify the specific species or individual responsible for the depredation. Predation might also be confirmed in the absence of bite marks and associated hemorrhaging (i.e., if much of the carcass has already been consumed by the predator or scavengers) if there is other physical evidence to confirm predation on the live animal. This might include evidence of an attack or struggle. There may also be nearby remains of other victims for which there is still sufficient evidence to confirm predation, allowing reasonable inference of confirmed predation on an animal that has been largely consumed.
- Probable Wolf Depredation – There is sufficient evidence to suggest that the cause of death was depredation, but not enough to clearly confirm that the depredation was caused by a wolf. A number of other factors will help in reaching a conclusion, such as (1) any recently confirmed predation by wolves in the same or nearby area, and (2) any evidence (e.g., telemetry monitoring data, sightings, howling, fresh tracks, etc.) to suggest that wolves may have been in the area when the depredation occurred. All of these factors and possibly others would be considered in the investigator's best professional judgment.
- Confirmed Non-Wild Wolf Depredation – There is clear evidence that the depredation was caused by another species (coyote, black bear, cougar, bobcat, domestic dog), a wolf hybrid, or a pet wolf.
- Unconfirmed Depredation – Any depredation where the predator responsible cannot be determined.
- Non-Depredation – There is clear evidence that the animal died from or was injured by something other than a predator (e.g. disease, inclement weather, or poisonous plants). This determination may be made even in instances where the carcass was subsequently scavenged by wolves.
- Unconfirmed Cause of Death – There is no clear evidence as to what caused the death of the animal.

Table 10. Compensation levels for each confirmed and probable wolf depredation of livestock (cattle, pigs, horses, mules, sheep, llamas, goats, and guarding/herding animals) in Washington.

Depredation	Grazing sites of 100 or more acres where the agency determines it would be difficult to survey the entire acreage (*double payment would not apply if all other animals were accounted for)	Other sites
Confirmed	Full current market value for 2 animals	Full current market value for 1 animal
Probable	Half the current market value for 2 animals	Half the current market value for 1 animal

### *Two-Tiered Payment Plan*

A two-tiered payment plan is used for confirmed and probable wolf-killed livestock on private and public lands (Table 10). Payments are higher on grazing sites of 100 or more acres, where the agency determines it would be difficult to survey the entire acreage because it is harder to find carcasses on larger sites (see Section A of this chapter). For each animal confirmed as a wolf kill on the larger sites, owners would receive the full current market value for two animals. For each animal documented as a probable wolf kill, owners would receive half the current market value for two animals. The higher payments are to account for a possible missed carcass and would not apply if there were no missing animals beyond the confirmed or probable kill. On grazing sites not meeting the above criteria, owners would receive the full current market value of each animal confirmed as a wolf kill and half the current market value of each animal documented as a probable wolf kill. On the smaller sites, payment does not include an additional animal because livestock owners should be able to supervise their stock more closely and find nearly all carcasses.

All payments are based on current market value, which is defined as the value of an animal at the time it would have normally gone to market. Appropriate documentation, such as a contract, previous sales record, or current market reports, will be required to help determine this value. Compensation payments will be contingent on availability of funding and, where applicable, any restrictions of state or private funding sources. If, in the future, a program is developed to compensate for unknown losses (see below), producers could receive payment under only one program - either confirmed/probable or unknown - but not both.

Compensation payments will be made in a timely manner using a system developed by WDFW (Chapter 12, Tasks 4.3 and 4.4). Payments for wolf-caused depredation will be reduced by the amounts received by the owner from insurance covering livestock losses or from any other source for the same purpose, including a federal or private compensation program. Payment will also be reduced by the amount received for any financial gain that the owner receives from the sale of a partially salvaged carcass or other product.

### *Payment for Injured Livestock*

Under this plan, producers would be able to recoup veterinary treatment costs for injured animals, not exceeding their current market value. If injured livestock need to be euthanized, owners will receive compensation for the current market value of the animal. If livestock are injured to the

extent that they must be sold prematurely, the operator will receive the difference between the selling price and current market value.

#### *Development of Compensation Payments for Unknown Losses*

There is interest in developing a program to compensate livestock producers for unknown losses presumed to be caused by wolves. It is recognized that this is difficult and can encounter numerous problems. After the plan is approved, WDFW will work with a multi-interest stakeholder group to attempt to develop an appropriate payment system for unknown livestock losses where there is no direct evidence that wolf predation caused the losses. The purpose of this part of the program would be to compensate livestock producers for losses in areas where wolves are confirmed to be present, documented wolf depredation is occurring nearby, and differences exist between historical and current return rates of livestock that are not attributable to other causes. Compensation for unknown losses would not be paid in addition to compensation for confirmed and probable losses. A producer could be compensated for one or the other, but not both.

The stakeholder group should contain an equal number of members representing livestock producer and conservation interests. Some of the criteria that would need to be part of a program to compensate for unknown losses include: development of a method to validate historical losses as a baseline, demonstration of current year losses, criteria for excluding payment for unusual levels of death losses from non-wolf-related sources (e.g., other predators, weather, disease), and determining the best method for reviewing and validating claims. A mechanism for reviewing this part of the compensation program would also need to be established in order to maintain accountability and assess effectiveness.

Idaho and Wyoming have developed programs to compensate for unknown losses. Idaho has encountered a number of limitations and problems in implementation (J. Allen, pers. comm.). For this type of compensation program to succeed, it must establish a high degree of accountability and verifiability, avoid creating a costly new bureaucracy, be as low cost as possible, be implementable, and be simple to understand and use. If such a compensation program meeting these conditions cannot be developed for Washington, WDFW will work with a balanced advisory group to determine the need for alternative compensation provisions. It is recognized that this would not be allowed under current state laws (WAC 232-36; Appendix A) and that if such a program were developed, the WAC would need to be amended.

#### *Funding Sources for Compensation*

WDFW will work with the livestock industry and conservation organizations to identify potential funding sources, including special state or federal appropriations, private foundations, and other private resources. These funding sources could augment state compensation and/or may provide funding for compensation of wolf-caused livestock losses that are not funded by the State Legislature. An example of one such funding source is the specialty license plates issued for this purpose by Wisconsin and Montana.

1 *Changes Needed to Make Current State Law Consistent with the Wolf Plan*

2  
3 Portions of the wolf compensation program in this plan are inconsistent with state laws (RCW 77.36  
4 and WAC 232-36). Inconsistencies include different payment levels, different definitions of  
5 livestock and eligible recipients, and coverage for unknown losses. In order to implement the plan's  
6 recommended compensation program using state funds, WAC 232-36 may need to be amended.  
7 Different fund sources may be needed to implement portions that are different from RCW 77.36  
8 (e.g. definitions of livestock, eligible recipients, etc).  
9

10 Accountability, Review, and Phasing Out

11  
12 The wolf compensation program will be subject to review, along with the rest of the wolf  
13 conservation and management plan, when the listing status of wolves changes from state  
14 endangered to threatened and from threatened to sensitive. Upon delisting, compensation for  
15 livestock depredations may transition to the provisions contained within WAC 232-36 for other  
16 predators, and could eventually be phased out depending on the type of management tools that are  
17 authorized and the flexibility of control options available to livestock owners. It is assumed that a  
18 new management plan will accompany delisting and the need for continued compensation will be  
19 evaluated at that time.

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## 5. WOLF-UNGULATE INTERACTIONS

Gray wolves dispersing into Washington likely will settle in areas with abundant prey that already support multiple types of predators and hunters. The effect on ungulate populations from adding wolves to existing predation levels and hunter harvest is difficult to predict in the state because of localized differences in predator and ungulate abundance, habitat characteristics, topography, and ungulate harvest management practices. However, information from Idaho, Montana, and Wyoming, each of which currently supports 340-700 wolves, as well as the Great Lakes states that each support between about 600 (Michigan, Wisconsin) and 3,000 (Minnesota) wolves, provides useful insight on impacts that can be expected in Washington as wolves reestablish. In general, wolves have had limited effect on overall elk and deer abundance and hunter harvest in these states, where most populations remain stable or are above population objectives (see Section B of this chapter). However, wolves have been linked to localized elk herd declines in some areas. In these locations, wolves are one of several factors affecting the herds (e.g., changes in habitat, severe winter weather, drought, hunting pressure, and increasing populations of other predators). In some wolf-occupied areas, hunter success rates have declined due to a variety of causes, including changes in elk behavior and habitat use as well as from localized declines in elk abundance.

This chapter focuses on interactions between wolves and wild ungulates and provides:

- background on wolf predation of ungulates (Section A)
- background on recent impacts of wolves on ungulates in others states (Section B)
- background on current status of ungulates in Washington (Section C)
- background on wolf-elk interactions on wintering grounds (Section D)
- estimates of predicted wolf predation on deer and elk in Washington (Section E)
- a description of the management tools available for managing wolf-ungulate interactions in Washington (Section F)

Specific management strategies pertaining to wolf-ungulate interactions are in Chapter 12, Task 5.

### A. Wolf Predation of Ungulates

Ungulates are the primary food of wolves throughout their geographic range. Prey selection by wolves probably reflects a combination of capture efficiency and profitability versus risk (Mech and Peterson 2003). Thus, wolves may concentrate on species that are easier to capture or offer greater reward for the amount of capture effort expended rather than on species that are most common. Diet can vary greatly among locations in the same region (Table 2) or even among packs living in the same vicinity (e.g., Kunkel et al. 2004, Smith et al. 2004) in response to differences in prey populations, seasonality, weather conditions, the presence of other predators, levels of human harvest, and other circumstances (Smith et al. 2004).

In the central and northern Rocky Mountains of the United States and Canada, wolves commonly rely on elk as their primary prey, but deer and moose are more important in some areas (Table 2). Moose are the major prey in much of British Columbia, including southern areas (G. Mowat, pers. comm.). Bighorn sheep and mountain goats are not regularly taken anywhere in the overall region,

probably because of little habitat overlap with wolves (Huggard 1993). In the Great Lakes states, white-tailed deer are the main prey of wolves (DelGiudice et al. 2009). Wolf diets in Washington are expected to be similar to those in the Rockies, with elk, deer, and, in some locations, moose being the primary prey species.

The rates at which wolves kill and consume prey are highly variable with respect to time of year and species taken. Both rates (usually expressed as biomass per wolf per day) have been investigated in many North American studies and average about 7.2 kg/wolf/day for kill rate (winter only; Mech and Peterson 2003) and 5.4 kg/wolf/day for consumption rate (winter only; Peterson and Ciucci 2003). The figure for kill rate roughly corresponds to about one 150-kg elk killed per 21 days per wolf (or 17 elk per wolf per year) or one 60-kg deer killed per 8.3 days per wolf (or 44 deer per wolf per year). In Yellowstone National Park, winter kill rates by wolves declined from 2000 to 2004 (1.1 elk/wolf every 30 days) compared to 1995 to 2000 (1.9 elk/wolf every 30 days), and wolf kill rates did not increase between early and late winter in the later period (2000-2004) compared to the first five years after wolf restoration (1995-2000) (Stahler et al. 2006). However, these estimates are probably somewhat inaccurate because they are based on (1) winter studies, when predation rates in terms of biomass consumed are highest causing annual take to be overestimated, and (2) do not account well for the number of fawns and calves killed in summer or supplementary prey (e.g., beavers, hares) taken in other seasons (Mech and Peterson 2003, Smith et al. 2004). In contrast, Sand et al. (2008) found that predation rates in terms of numbers of prey killed by wolves in Scandinavia were much higher in summer than winter due to the large number of juveniles taken, which would cause total annual kill to be underestimated when extrapolating from winter-only data. White et al. (2003) attempted to overcome some of these problems and estimated an annual kill rate of 25 ungulates per wolf in prey-rich Yellowstone National Park. It should be noted that wolf kill rates are generally higher for reestablishing and expanding wolf populations like those at Yellowstone than for long established and stable populations (Jaffe 2001).

Wolves are selective hunters and tend to choose more vulnerable and less fit prey. Young-of-the-year (especially in larger prey like elk and moose), older animals, and diseased and injured animals are taken in greater proportion than healthy, prime-aged individuals (Mech 1970, 2007; Fritts and Mech 1981; Kunkel and Pletscher 1999; Kunkel et al. 1999; DelGiudice et al. 2002, 2006; Mech and Peterson 2003; Smith et al. 2004; Stahler et al. 2006; Sand et al. 2008; Boertje et al. 2009; Hamlin and Cunningham 2009). In some areas and situations, wolves select adult bull elk disproportionately. This may relate to the relatively poor condition that bull elk are in during winter and their choice of habitat (Atwood et al. 2007, Winnie and Creel 2007, Hamlin and Cunningham 2009). Winter severity, particularly greater snow depth, increases wolf predation on deer (Nelson and Mech 1986, DelGiudice et al. 2002, 2006). Similar to other coursing predators that chase prey over long distances, wolves will test and evaluate available prey, and will focus on those animals that require the least energy to capture and present the least risk of injury or death to pack members. When young or infirm animals are not available, wolves are capable of killing healthy, prime-aged animals. Predatory performance of individual wolves declines with age (MacNulty et al. 2009).

Prey species have evolved defensive techniques such as alertness, speed, herding behavior, synchronous birthing of young, spacing, migration, and selection of safer habitat including retreating into water to reduce their vulnerability to wolves (Mech and Peterson 2003, Laporte et al. 2010, Muhly et al. 2010b). Because of these defense mechanisms, the majority of hunts initiated by wolves are unsuccessful. Hunting success of wolves can be influenced by many factors, including pack size,

terrain, habitat features, snow and other weather conditions, time of day, prey species, age and condition of prey, season, and experience (Mech and Peterson 2003, Hebblewhite 2005, Kauffman et al. 2007).

The impacts of wolves on prey abundance have been, and continue to be, widely debated (see Boutin 1992). Some common conclusions on this topic have been drawn. A number of studies indicate that wolf predation can limit ungulate populations (Bergerud and Snider 1988, Larsen et al. 1989, Ballard et al. 1990, Skogland 1991, Gasaway et al. 1992, Dale et al. 1994, Messier 1994, Van Ballenberghe and Ballard 1994, Adams et al. 1995, Boertje et al. 1996, National Research Council 1997, Hayes and Harestad 2000, Hebblewhite et al. 2002, 2006, Hayes et al. 2003, Mech and Peterson 2003, White and Garrott 2005, Hebblewhite and Merrill 2007). Population-level effects result primarily through predation on young-of-the-year and are frequently enhanced when occurring in combination with other predators (e.g., bears) (Larsen et al. 1989, Barber-Meyer et al. 2008, Boertje et al. 2009).

Creel et al. (2009) and Christianson and Creel (2010) reported that elk declines in the greater Yellowstone ecosystem were not in fact caused by actual wolf predation, but instead resulted simply from the threat of wolf predation. They hypothesized that female elk responded to the presence of wolves by spending less time feeding and moving to safer habitats of poorer nutritional quality, resulting in reduced nutrition and lowered calf production that pushed the population downward. However, recent evidence refutes this theory by showing that Yellowstone cow elk have maintained high levels of body fat (some of the highest in North America) and high pregnancy rates in the years following wolf reintroduction (White et al. 2011).

Several studies have detected little or no effect from wolves on ungulate populations (Thompson and Peterson 1988, Bangs et al. 1989, Peterson et al. 1998; see Mech and Peterson 2003; DelGiudice et al. 2006, 2009). Mech and Peterson (2003) suggested three reasons why researchers have failed to reach agreement regarding the significance of wolf predation on the dynamics of prey populations. These are: (1) each predator-prey system has unique ecological conditions, (2) wolf-prey systems are inherently complex, and (3) population data for wolves and their prey are imprecise and predation rates are variable. Whether the prey population exists at or below its ecological carrying capacity is another important element in assessing the results of such studies (D. W. Smith, pers. comm.). As pointed out in many studies, numerous other factors (human harvest, severe winters, variable forage quality, fluctuating abundance of other predators and prey, disease, human disturbance and development, and vehicle collisions) also influence prey populations and complicate the ability to make solid conclusions about wolf-related impacts. In summary, wolf-prey interactions are probably best characterized as being exceedingly complex and constantly changing, as seen at Isle Royale National Park, Michigan, where wolf-moose relationships still cannot be predicted with confidence despite 50 years of detailed research on this subject (Vucetich and Peterson 2009).

The question of whether wolf-caused mortality is “compensatory” or “additive” is another widely debated topic. Predation is considered compensatory when it replaces other mortality sources (starvation, disease, etc.) that would have otherwise occurred. Predation can be classified as additive when prey are lost that would not have died of other causes in the short term. Mech and Peterson (2003) concluded that in most cases wolf predation is probably a combination of both (e.g., see Varley and Boyce 2006). This holds especially true for predation on young animals (calves and

fawns), where because of their increased vulnerability, some young killed by wolves would have likely survived to adulthood.

Analyses from Yellowstone National Park are contradictory on this topic. Vucetich et al. (2005) reported that wolf predation on elk in the park was primarily compensatory in the first decade after wolf reestablishment and replaced mortality that would have been caused by hunting and severe winter weather, but noted that wolf predation could become more additive in the future as circumstances (e.g., weather patterns, overall rates of predation) change. Others (White et al. 2003, White and Garrott 2005) have concluded that take of female elk by wolves and hunters is probably additive because of the high survival rates of females in the absence of hunting and major predators. In multi-predator ecosystems, where species such as cougars, bears, and coyotes also exist, one might expect that wolf reestablishment would result in declines in some other predators and that wolf predation would therefore be compensatory. However, under recent conditions at Yellowstone, predation (primarily by bears, but also including that by wolves and coyotes) on elk calves was considered mainly additive (Barber-Meyer et al. 2008). At Glacier National Park, Kunkel and Pletscher (1999) reported that prey losses from wolves were largely additive to those from other predators. Recent evidence from five northwestern states indicates that wolf predation on young elk calves is minor and most likely compensatory with predation by other species (Griffen et al. 2011).

A myriad of literature can be produced that presents examples of each type of mortality in predator-prey systems involving mammals. Each is unique to the ecosystem studied and the inherent strengths and weaknesses of the study design. However, one major influence on the conclusions of such studies is whether or not the prey population occurred at carrying capacity. Wolf predation is often determined to be compensatory for prey populations at or near carrying capacity, but additive for those below carrying capacity (D. W. Smith, pers. comm.). For example, wolf predation may be a source of compensatory mortality in white-tailed deer relative to starvation if deer numbers are beyond the carrying capacity of their range during winters of higher severity (DelGiudice et al. 2002). It is beyond the scope of this plan to attempt to evaluate these studies in the context of wolf reestablishment in Washington, and would add little value in terms of a management plan. For a more complete treatment on the theories of predator regulation, compensation, and other related topics on population dynamics, see Sinclair and Pech (1996).

Eberhardt et al. (2007) reported that predation by wolves has a much lower overall impact on ungulate populations than does antlerless harvest by hunters. Wolves primarily prey on young of the year and older individuals beyond their prime, both of which have lower reproductive value, whereas antlerless removals by hunters result in a greater proportional take of adult females of prime age. Thus, wolf predation has considerably less effect on reproductive rates and growth of populations. Eberhardt et al. (2007) also remarked that to maintain ungulate populations exposed to both hunting and predation by multiple species of large carnivores at or near carrying capacity, hunter harvests of females need to be conservative. Others have suggested consideration of winter severity, snow depth, ungulate population goals, and use of antlerless permits in an integrated ecological approach to wolf-ungulate management (DelGiudice et al. 2002, 2009).

As with other predators, wolf predation has the potential to threaten some small populations of prey, which often have a limited capacity to increase. In Washington, examples of such populations potentially include mountain caribou and certain herds of bighorn sheep.

Preliminary evidence suggests that wolf predation can reduce the occurrence of some diseases in prey populations through the removal of infected individuals, thus perhaps imparting an overall benefit to surviving animals (Wild et al. 2005, 2011, Barber-Meyer et al. 2007). For example, wolf predation could potentially reduce the prevalence of brucellosis in elk, an increasing problem in Wyoming, by reducing elk numbers and group sizes (Cross et al. 2010), or chronic wasting disease in deer (Wild et al. 2011). However, in situations where predation might cause greater herding behavior, increased transmission of other diseases could result (Barber-Meyer et al. 2007).

## **B. Recent Impacts of Wolves on Ungulates in Other States**

### Montana

Elk populations are considered to be at or above management objectives in most areas of Montana (Ballard 2009). Impacts of wolves on elk herds vary considerably with location, habitat, landownership, and management (Hamlin and Cunningham 2009, Hamlin et al. 2009). In a few locations with public lands managed for nature conservation and having few livestock and few predator-livestock conflicts, wolf and grizzly bear numbers have generally increased and contributed to decreasing elk numbers through predation or behavioral changes.

Wolf predation is one of several causes, along with high human harvest (including high antlerless take through 2005), drought, severe winters, and increased bear and cougar predation, contributing to a 72% decline (from about 16,800 to 4,600) in the northern Yellowstone elk herd from 1996 to 2010, which had existed at artificially high levels for decades due to declines and extirpations of large predators. As the wolf population expanded, it had an increasingly greater impact on this herd (Vucetich et al. 2005, White and Garrott 2005, Barber-Meyer et al. 2008). However, bear predation on elk calves has greatly increased over the last decade or two in and around Yellowstone National Park and is currently having a larger impact on elk recruitment than wolf predation (Barber-Meyer et al. 2008). Cougar densities have also increased in the park over the past decade (Hebblewhite and Smith 2010). The wolf population has fallen from a peak of 174 wolves in 2003 to 97 wolves in 2010, mostly because of the smaller elk population (USFWS et al. 2011).

The wintering Gallatin elk herd declined from about 1,500 to 225 elk between 2005 and 2009 due in part to the high numbers of wolves and grizzlies living in the area, but much of the decline is also related to the shift of many elk to neighboring winter range in the Madison Valley in response to high levels of hunter harvest and wolf and bear predation (Cunningham 2009). The West Fork of the Bitterroot elk population decreased from about 1,900 to 750 elk from 2005 to 2010 (MFWP 2010). Wolf predation is considered a main factor in the decline because cougar and black bear harvests in the area remain high, habitat conditions for elk are favorable, antlerless elk hunting opportunity was reduced, and poor weather has not occurred.

In contrast, on public multiple-use lands surrounded by private agricultural lands and in valleys that contain largely private agricultural ownership, lethal wolf control is practiced to remedy conflicts with livestock, which keeps local wolf densities low enough to minimize impacts on elk populations. This and other factors have allowed elk herds in two-thirds of the hunting districts in southwestern Montana (all of which support some wolves) to remain stable or expand. These areas currently allow some of the most liberal elk hunting opportunities seen in 30 years (J. Gude, pers. comm.).

Most information suggests that pregnancy rates, calf survival, and adult female survival of elk in Montana have not been affected by wolves, although cow and calf survival has declined in some areas with high numbers of wolves (Hamlin and Cunningham 2009, Hamlin et al. 2009, MFWP 2010). During the winter, wolves can have localized effects on elk distribution and movement rates, but such impacts are less than those created by human hunting activity (Hamlin and Cunningham 2009). Data suggest the possibility that wolves may have some effects on the larger-scale seasonal distribution of elk and the timing of elk migration in parts of southwestern Montana (Hamlin and Cunningham 2009).

Direct impacts on deer and other ungulates in Montana have not been well documented to date (C. Sime, pers. comm.), but an increase in mule deer abundance and recruitment has been noted in parts of southwestern Montana where elk abundance and recruitment have declined (Hamlin and Cunningham 2009). In northwestern Montana, where white-tailed deer are likely the primary prey of wolves (Boyd et al. 1994, Kunkel et al. 1999, Arjo et al. 2002), white-tailed deer numbers have increased during much of the period of wolf recovery. Recent decreases in deer numbers were associated with record or near record antlerless deer harvest and two severe winters (USFWS et al. 2009).

#### Idaho

A recent assessment by the Idaho Department of Fish and Game determined that 23 of 29 elk management zones in Idaho were within or above management goals for female elk (IDFG 2010a). An ongoing study in a representative sample of 11 elk management zones found that wolves were the primary cause of death of female elk in three of those zones (Lolo, Smoky Mountains, Sawtooth zones). Mountain lions either equaled or exceeded wolves as the primary cause of elk mortality in two additional elk management zones (Elk City, Salmon). Elk populations have been declining in these five zones since 1995 or earlier, and are below management objectives in the Smoky Mountains, Lolo, and Sawtooth zones. Hunter harvest was the primary cause of death in the other six zones.

Besides predation, other factors affecting elk survival include habitat conditions, weather, and hunter harvest. Severe winters and deteriorating habitat conditions have contributed to long-term declines in elk populations in the Sawtooth and Lolo zones (IDFG 2010a). The Lolo herd fell from 16,050 to 4,700 elk from 1989 to 2002-2003, when wolves were either absent or present in small numbers (IDFG 2010b). Since then, however, wolves have become the greatest source of mortality, accounting for 74% of deaths of cow and calf elk (IDFG 2010b). The total elk population in this zone numbered about 2,200 animals in 2010, with cow and calf elk survival below the rates needed for population growth.

IDFG (2008) has reported that wolves are possibly reducing success rates for some hunters in parts of the state without declining elk populations by changing the behavior and habitat use of elk during the hunting season. As observed in the greater Yellowstone ecosystem (Creel and Winnie 2005, Mao et al. 2005), Idaho's elk may now be spending more time in forested areas, on steeper slopes, and at higher elevations than before wolf reintroductions, making it more difficult for hunters to find animals. Changes in herding behavior and movement rates due to wolf- and human-predation risk (Proffitt et al. 2009) may also affect hunting success.

Wolves are believed to be a main factor in the recent decline of moose in the Lolo zone, but their impact on moose abundance in other parts of Idaho is not well known (J. Rachael, pers. comm.). Moose populations in some areas may be more directly affected by habitat changes, harvest levels, or other causes (S. Nadeau, pers. comm.). The impact of wolves on deer and other ungulates in the state appears negligible (J. Rachael, pers. comm.; S. Nadeau, pers. comm.), and white-tailed deer numbers increased moderately during the first decade of wolf recovery (IDFG 2004).

## Wyoming

All 22 state-managed elk herds surveyed in Wyoming during the winter of 2008-2009 were at or above population objectives (Schilowsky 2009, J. Obrecht, cited in Ballard 2009), suggesting that wolves have had relatively little, if any, impact on elk abundance at the state level. Some of these herds occur in areas where wolf numbers are controlled to reduce conflicts with livestock, which has helped lessen impacts on elk (M. D. Jimenez, pers. comm.). Wolf predation is believed to be an important contributing factor in the decline of the Madison Headwaters elk herd at Yellowstone National Park (Hamlin et al. 2009) and the decline in calf/cow ratios in three elk sub-herds (Sunlight Basin, Gros Ventre, and Spring Mountain) in other parts of western Wyoming (M. D. Jimenez, pers. comm.).

To date, wolves have not had substantial effects on other ungulates in the state (White and Garrott 2005, White et al. 2008; M. D. Jimenez, pers. comm.). Wolves are considered a potential threat to populations of bighorn sheep and moose on their wintering ranges, but documented effects on such populations are lacking (WGFC 2008). A severe decline in moose has occurred in northwestern Wyoming since the late 1980s, but the decline has been primarily attributed to deteriorating habitat quality, with bear and wolf predation being a minor contributing factor (Becker 2008).

## Minnesota, Wisconsin, and Michigan

In the Great Lakes region, where about 4,000 wolves occur, white-tailed deer populations are thriving and continue to be managed at relatively high densities with numbers often above local management goals (DelGiudice et al. 2009). Annual hunter harvest has remained high in the region, averaging 96,000 deer in Minnesota, 148,000 deer in Wisconsin, and 73,300 deer in Michigan. Wolves have been estimated to reduce the pre-harvest deer populations in Minnesota, Wisconsin, and Michigan by <15%, <1.8%, and about 1.3%, respectively (DelGiudice et al. 2009). In Wisconsin, a study that compared deer densities in deer management units with and without wolves from 1987 to 1997 found no significant differences in deer densities and recruitment (WDNR 1999). Habitat and climatic factors seem to have greater impacts on deer population trends in Wisconsin than wolf predation. Mech and Nelson (2000) concluded that wolf predation did not influence hunter harvest of deer in most areas of Minnesota, but did exert a negative impact in locations with low deer densities.

## **C. Ungulate Status in Washington**

### Elk

Elk are a highly valued resource in Washington. Ten major herds are recognized in the state (Figure 13) and range in size from estimates of 1,250 to over 13,000 animals (Table 11). These total

61,000 or more animals statewide, of which about 61% occur west of the Cascade crest. Additionally, smaller but unknown numbers of elk reside year-round on some tribal and federal lands (Figure 13), but are excluded from the herds recognized by WDFW. Elk are largely absent from a sizable portion of the state, including much of the Columbia Basin, much of Okanogan County, the North Cascades, and the Puget Sound region (Figure 13). Elk are not uniformly distributed within identified herd ranges, but instead are concentrated in some areas and less abundant or absent in other areas. Many herds display distinct seasonal movements, which also influence distribution. Animals generally occupy higher elevations in the summer and lower elevations in the winter (usually November to April).

The greatest source of adult and yearling elk mortality (55-69%) in those portions of the state examined thus far is legal harvest (including wounding loss); illegal killing accounted for an additional 5-14% of adult and yearling elk mortality (Table 12). About 8,000 elk are harvested annually in Washington, excluding kill by treaty tribes. Marked reductions in timber harvest, especially in western Washington, increased exclusion of fire in eastern Washington, and increasing human populations in elk habitat have reduced the state's carrying capacity for elk compared to past decades. However, in eastern Washington, some of this reduced capacity has been offset in recent years by the occurrence of large high-severity fires, which have created substantial areas of early successional forest (i.e., good foraging habitat). Each herd is different and has different management issues. Individual summaries of the 10 herds are provided below.

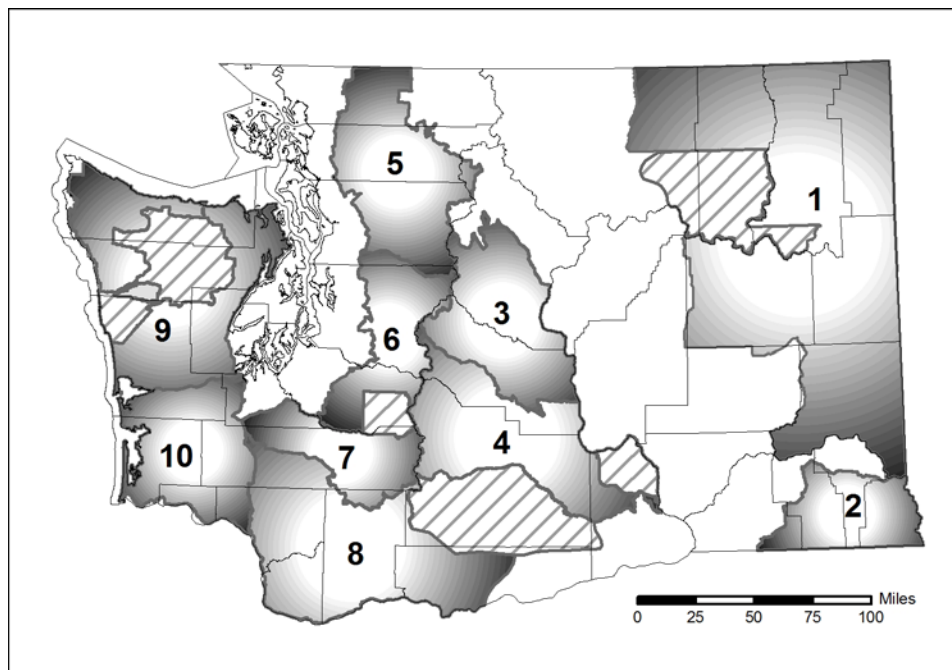


Figure 13. Ten major elk herds managed by WDFW in Washington (1, Selkirk herd; 2, Blue Mountains herd; 3, Colockum herd; 4, Yakima herd; 5, North Cascade (Nooksack) herd; 6, North Rainier herd; 7, South Rainier herd; 8, Mount St. Helens herd; 9, Olympic herd; and 10, Willapa Hills herd). Elk living year-round on some tribal and federal lands are not included in these herds, but their distribution is illustrated here (diagonal lines) to give a more complete depiction of elk distribution in the state.

Table 11. Current population estimates of the 10 major elk herds managed by WDFW in Washington (from WDFW 2008-2011). Estimates represent the number of elk present in each herd after the hunting season and before the calving season.

Elk herd <sup>b</sup>	Estimated herd size <sup>a</sup>	
	Eastern Washington	Western Washington
1. Selkirk	2,400	-
2. Blue Mountains	5,100	-
3. Colockum	4,880	-
4. Yakima	11,320 <sup>c</sup>	-
5. North Cascade (Nooksack)	-	1,248
6. North Rainier	-	3,200
7. South Rainier	-	2,100
8. Mount St. Helens	-	>13,000 <sup>d</sup>
9. Olympic	-	8,620
10. Willapa Hills	-	9,000-11,000
Total	23,700	37,168-39,168

<sup>a</sup> Excludes animals residing year-round on tribal and National Park Service lands. For example, an estimated 5,000 elk reside inside the Yakama Reservation (J. Bernatowicz, pers. comm.) and 3,060 elk are present inside Olympic National Park (Jenkins and Manley 2008).

<sup>b</sup> The herd numbers (1 through 10) used in this column correspond to those displayed in Figure 13.

<sup>c</sup> Includes the Rattlesnake Hills sub-herd.

<sup>d</sup> Estimating techniques for the Mount St. Helens herd are currently under improvement. Project completion and better estimates are anticipated in 2012.

Table 12. Examples of elk mortality in Washington.

Herd(s) and age group	Sample size	Cause of mortality (%)							Source <sup>a</sup>	
		Legal harvest	Wound- ing loss	— Illegal Killing	Malnu- trition	Preda- tion	Other natural causes	Vehicle and other accidents		Un- known causes
<b>Adults, yearlings</b>										
Mt. St. Helens, Olympic, Colockum	165	59	7	15	12	2	-	<2	3	1
Blue Mountains <sup>b</sup>	47	41	14	9	-	11 <sup>c</sup>	-	-	25	2
Blue Mountains	78	60	5	5	1	13 <sup>d</sup>	8	-	8	3
Yakima	39	56	13	13	13 <sup>e</sup>	5 <sup>e</sup>	-	-	-	4
<b>Calves</b>										
Blue Mountains	113	5	-	-	-	76 <sup>f</sup>	-	2	16	5

<sup>a</sup> Source and dates of study: 1, Smith et al. (1994), 1988-1993; 2, Myers et al. (1999a), 1990-1996; 3, McCorquodale et al. (2010), 2003-2006; 4, McCorquodale et al. (2003) and S. M. McCorquodale (pers. comm.), 1992-1999; 5, Myers et al. (1999b), 1992-1998.

<sup>b</sup> Study results also included two capture-related mortalities and three cougar mortalities that were likely related to capture activities, but these are excluded here.

<sup>c</sup> Predation was attributed to cougars in three instances and undetermined predators in two instances.

<sup>d</sup> Cougar predation was confirmed in four instances and strongly suspected in five others (S. M. McCorquodale, pers. comm.). An undetermined predator was involved in one instance.

<sup>e</sup> In addition to the hunting-related losses cited in McCorquodale et al. (2003), S. M. McCorquodale (pers. comm.) reported that five elk were considered winterkill and two were killed by cougars.

<sup>f</sup> Predation was attributed to cougars (60% of predation losses), black bears (21%), coyotes (6%), and unknown predators (13%).

1 **1. Selkirk Herd** – Herd size totals about 2,400 elk, which represents substantial growth from an  
2 estimate of 1,200 animals in 2001 (WDFW 2001a, 2008). The management objective for this herd is  
3 being developed and will be finalized when the herd's management plan is completed. The herd is  
4 informally broken into two sub-herds known as (1) the Pend Oreille sub-herd located in Pend  
5 Oreille, Stevens, Ferry, eastern Okanogan, and northern Spokane counties, and (2) the Spokane sub-  
6 herd in southern Spokane, Lincoln, and Whitman counties. Habitat conditions in parts of the herd's  
7 range appear favorable for continued population growth for at least the near future (Zender and  
8 Base 2006). Damage to agricultural crops has been an ongoing problem at various sites south of the  
9 Spokane River and at a few farms in northern Pend Oreille County.

10  
11 Current harvest management consists of:

- 12 1) A general hunting season for bulls or either-sex elk, depending on the Game Management  
13 Unit (GMU) and weapon type.
- 14 2) A special permit season for a limited number of either-sex elk in GMUs having any bull  
15 general seasons.
- 16 3) A tribal either-sex season conducted by the Colville, Spokane, and Kalispel tribes on their  
17 respective reservations and on the "North Half" (GMUs 101 and 204) by the Colville tribe.

18  
19 **2. Blue Mountains Herd** –Recent herd estimates of about 5,100 elk are within the management  
20 objective of 4,800-5,900 elk (WDFW 2001b, 2008, Fowler and Wik 2010a). Abundance has been  
21 limited by habitat changes, loss of habitat, and past levels of antlerless and damage-related hunting.  
22 The herd occupies an area of about 900 mi<sup>2</sup>. Elk damage to crops and fences is a continuing  
23 problem on the lowland portions of the herd's range.

24  
25 Current harvest management consists of:

- 26 1) A general season for spike bulls or antlerless elk, depending on GMU and weapon type.
- 27 2) A special permit season for a limited number of any bulls, 3-point minimum bulls, or  
28 antlerless elk, depending on GMU and weapon type.
- 29 3) A tribal either-sex season held by the Umatilla and Nez Perce tribes.

30  
31 **3. Colockum Herd** – This herd has shown a declining trend since the late 1990s due to high  
32 antlerless and damage-related harvest and hard winters in the early 1990s (WDFW 2006a).  
33 However, the most recent herd estimate totals about 4,880 elk, which is at the desired population  
34 objective of 4,100-5,000 animals (J. Bernatowicz, pers. comm. 2011). The herd inhabits about 1,600  
35 mi<sup>2</sup>, with most use occurring in the eastern half of the area. Elk damage on private lands has been a  
36 problem at a number of locations since the late 1980s.

37  
38 Current harvest management consists of:

- 39 1) A general season for spike bulls or either-sex elk, depending on GMU and weapon type.
- 40 2) A special permit season for small numbers of bulls or antlerless elk, depending on GMU and  
41 weapon type, mostly to address agricultural damage.
- 42 3) A tribal either-sex season held by the Yakama Nation.

43  
44 **4. Yakima Herd** – Total numbers in this herd were about 11,320 elk as of 2011. About 10,550 elk  
45 occur in the Cascade Slope sub-herd that resides west of the Yakima River, whereas the much  
46 smaller Rattlesnake Hills sub-herd, numbering about 770 animals, is centered on the Arid Lands  
47 Ecology Reserve and Yakima Training Center east of the Yakima River (WDFW 2002a, 2008,

unpubl. data; Bernatowicz and Livingston 2010). The main sub-herd is considered at management objective at 10,550 (WDFW 2008). The herd size estimate of 11,320 does not include an additional estimated 5,000 elk residing year-round on the Yakama Reservation (J. Bernatowicz, pers. comm.). Two unique aspects of management of this herd come from the extensive crop damage that it has caused dating back to the early 1900s. This has resulted in the building and maintenance of more than 100 miles of elk-proof fencing to keep animals out of high value croplands and orchards. Because the fences block elk from their historical winter range, WDFW conducts a large-scale winter-feeding program at nine sites to keep animals at higher elevations (see Section D of this chapter for more information on the winter-feeding of this herd).

Current harvest management consists of:

- 1) A general season for spike bulls or antlerless elk, depending on GMU and weapon type.
- 2) A special permit season for a limited number of bulls, antlerless elk, or either-sex elk, depending on GMU and weapon type.
- 3) Some tribal either-sex hunting by the Yakama nation and Umatilla tribe.

**5. North Cascade Herd** – This herd, also known as the Nooksack herd, is the smallest in Washington and currently numbers about 1,248 elk (S. McCorquodale, pers. comm. 2011). The remains below the population objective of 1,750-2,150 animals, but the herd has shown positive growth in recent years (WDFW 2002b, 2008). Augmentation efforts in 2003 and 2005 added reproductive-aged females and calves to the herd. The core population currently inhabits about 500 mi<sup>2</sup> between the Skagit River and Mt. Baker (WDFW 2002b). Intensive logging and loss of winter range from urban development and agricultural conversion are the main threats to the herd. Elk cause some agricultural damage in the Skagit River valley.

Current harvest management consists of:

- 1) A general season for 3-point minimum bulls or antlerless elk, depending on GMU and weapon type.
- 2) A special permit season for a small number (less than 20 at this writing) of any bulls, depending on GMU and weapon type.
- 3) An equally limited number of elk permits authorized by the Point Elliot Treaty tribes for tribal members.

**6. North Rainier Herd** – Herd size totals about 3,200 elk, which is above the management objective of 2,520-3,080 animals (R. Link, pers. comm. 2011). The bulk of the herd ranges over a 2,800-mi<sup>2</sup> area of eastern King and Pierce counties. Herd numbers declined 46% from 1989 to 2000 (WDFW 2002c), but have since stabilized. The decline was attributed to several interrelated factors including antlerless harvest, predation, a decline in habitat quantity and quality due to forest succession, low calf survival, and poor nutrition.

Current harvest management consists of:

- 1) A general season for any bull, 3-point minimum bulls, or antlerless elk, depending on GMU and weapon type.
- 2) A special permit season for a small number of bulls in GMUs 485 and 653.
- 3) Tribal either-sex or bull-only hunts (depending on GMU) by the Medicine Creek Treaty and Point Elliot Treaty tribes.

**7. South Rainier Herd** – This herd contains about 2,100 elk, which is below the desired objective of 2,700-3,300 animals (WDFW 2002d, 2008). Most of the herd occupies a 1,000-mi<sup>2</sup> area of northern Lewis and southern Thurston counties and southern Mt. Rainier National Park. WDFW has tried to balance the desire to meet the current population objective, maintain hunting opportunity, and address depredation on crops. Agricultural and property damage by the elk herd has increased over the past 10-15 years.

Current harvest management consists of:

- 1) A general season for 3-point minimum bulls or antlerless elk, depending on GMU and weapon type.
- 2) A tribal either-sex season by the Medicine Creek Treaty tribes.

**8. Mount St. Helens Herd** – This is one of the largest herds in the state, with over 13,000 elk (WDFW 2006b, 2008). Management objectives call for numbers to be reduced to 9,000-11,000 animals by 2015, primarily through expanded antlerless harvest. Abundance is highest in south-central Lewis, Cowlitz, and northern and central Skamania counties (WDFW 2006b). Numbers are relatively low in the southern portion of the herd's range (GMUs 564, 568, 574, 578, and 388), where liberal harvests of elk are conducted to enhance deer abundance and minimize conflicts. Wintering elk in the Toutle River valley, which typically comprise only about 3-6% of the herd, occasionally suffer substantial mortality from malnutrition caused by winter weather conditions and declining forage quality (WDFW 2006b). Chronic elk damage to agriculture and commercial forestlands occurs in several areas and has become more widespread in recent years.

Current harvest management consists of:

- 1) A general season for 3-point minimum bulls, antlerless elk, or either-sex elk, depending on GMU and weapon type.
- 2) A special permit season for bulls or antlerless elk, depending on GMU and weapon type.
- 3) No tribal harvest occurs.

**9. Olympic Herd** – This herd holds an estimated 8,620 elk and has shown some recent population growth, but remains below the management objective of 10,200-12,500 animals (WDFW 2005b, 2008). These numbers exclude Olympic National Park, where an additional 3,060 elk are estimated to reside year-round (Jenkins and Manley 2008). Elk abundance is highest on the west side of the Olympic Mountains, followed by several southern drainages (WDFW 2005b, Jenkins and Manley 2008). Elk are less common on the northeast and east sides of the Olympic Peninsula, where small groups are generally present. Restrictions on antlerless harvest have allowed the herd to increase over the past decade. Damage caused by the herd is generally restricted to a few localized areas.

Current harvest management consists of:

- 1) A general season for 3-point minimum bulls or antlerless elk, depending on GMU and weapon type.
- 2) A special permit season for small numbers of any bull or 3-point minimum bulls, depending on GMU and weapon type, mostly to address agricultural damage issues.
- 3) A tribal either-sex hunt by nine treaty tribes on the Olympic Peninsula.

**10. Willapa Hills Herd** – This herd occurs almost entirely on private industrial timberland and numbers an estimated 9,000-11,000 animals (J. Nelson, pers. comm. 2011). A herd management

plan is being prepared by WDFW, which will include management objectives. Little research has been conducted on the biology of this herd, but one current study suggests that survival among adult bulls is below herd objectives. The herd causes only minor agricultural damage.

Current harvest management consists of:

- 1) A general season for 3-point minimum bulls, antlerless elk, or either-sex elk, depending on GMU and weapon type.
- 2) A special permit season for small numbers of antlerless elk, depending on GMU and weapon type, mostly to address agricultural damage issues.
- 3) No tribal harvest occurs.

## Deer

Two species of deer, represented by four subspecies, occur in Washington: mule deer, black-tailed deer, white-tailed deer, and Columbian white-tailed deer (Figure 14). Total deer numbers in the state are estimated at roughly 300,000 animals (after hunting season and before fawning season; J. Nelson, pers. comm.), with population trends varying by species and location. From 2000 to 2010, hunters harvested an average of about 38,600 (range of 34,000 to 44,500) deer annually in Washington, which was divided fairly equally among black-tailed deer, white-tailed deer, and mule deer (Nelson 2009; WDFW unpubl. data). Deer generally prefer habitat in early to mid-successional stages. Reductions in clear-cutting, fire exclusion in eastern Washington, and other changes in forest management practices on public lands and expanding human development in low elevation habitats have caused a decline in deer abundance in Washington since the early 1980s (Nelson 2009). However, some of the loss of suitable habitat for deer has been offset in recent years by the

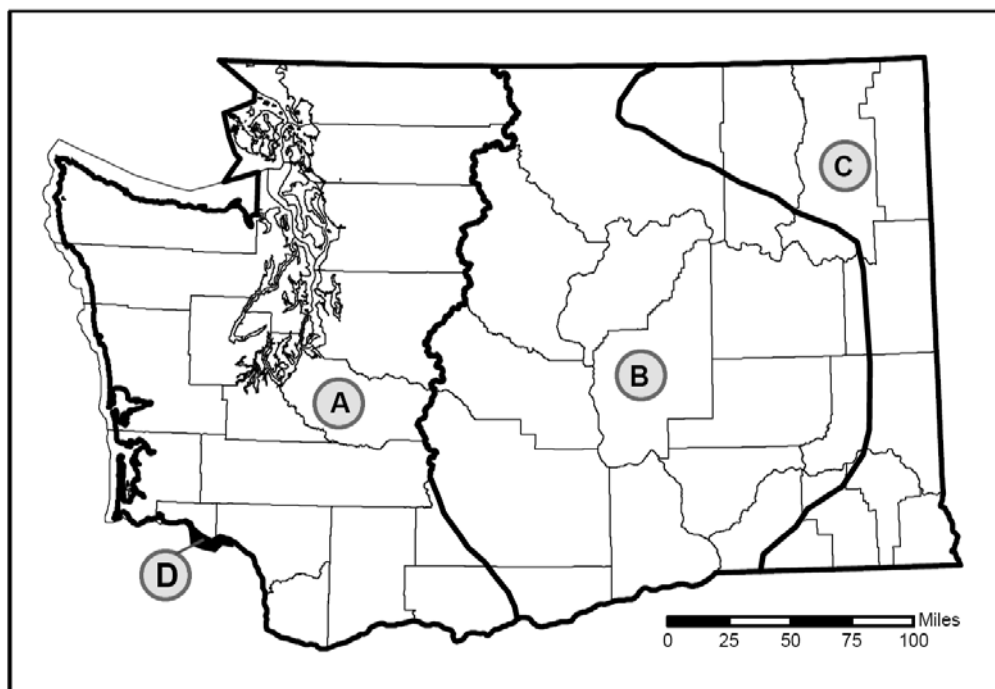


Figure 14. Distribution of four deer subspecies in Washington (A = black-tailed deer; B = mule deer, C = mule deer and white-tailed deer, D = Columbian white-tailed deer and black-tailed deer). Some overlap of subspecies occurs along the depicted range boundaries.

increased occurrence of large fires of severe intensity in eastern Washington, which have created large areas of early successional forest.

Unlike elk, deer in Washington are not currently assigned to or managed as herds. Instead, WDFW manages deer harvest by Population Management Units (PMU), which are defined geographic areas usually comprised of multiple game management units. Population estimates are generally unavailable for specific PMUs, but population trends are tracked using harvest and survey data. WDFW's goal for managing black-tailed deer, mule deer, and white-tailed deer populations is to maintain numbers within habitat limitations, while taking into account landowner tolerance, a sustainable harvest objective, and interests in non-consumptive opportunities. Deer-related damage to agricultural land and residential properties is widespread and will continue to increase as human activity expands across traditional deer habitat. Deer-vehicle collisions are a problem in some areas (Myers et al. 2008).

#### *White-tailed Deer*

White-tailed deer occur primarily in the eastern quarter of Washington (Figure 14). Total population estimates are beyond the scope of WDFW's budget and staffing resources (WDFW 2010a), but white-tailed deer numbers statewide are probably somewhat higher than for mule deer or black-tailed deer. Densities are highest in Pend Oreille, Stevens, and Ferry counties. Population trends have been gradually declining in these counties since the early 1990s due in part to a substantial reduction in grain and alfalfa production (WDFW 2010a). Trends are generally stable or increasing elsewhere.

White-tailed deer commonly undertake seasonal movements in elevation in many areas of their Washington distribution. Populations are influenced significantly by winter severity and tend to increase during years with mild winters and experience major declines during severe or protracted winters. Outbreaks of epizootic hemorrhagic disease have also produced some temporary localized declines. White-tailed deer have one of the highest potential maximum rates of increase of any North American ungulate due to their early age at first reproduction and ability to produce twins when nutritionally fit. Coupled with a higher tolerance for human disturbance and agriculture, white-tailed deer can persist and thrive in Washington. These traits make the white-tailed deer somewhat less susceptible to harvest level than mule deer.

Estimated numbers of white-tailed deer harvested in Washington have been variable but with a slightly declining trend since 2001, with an average annual kill of about 13,200 animals from 2001 to 2010 (WDFW 2008, unpubl. data). Current harvest management consists of:

- 1) An early general season in October for bucks as well as either-sex hunts in many locations for youth, seniors, and hunters with disabilities. Some GMUs have antler point restrictions.
- 2) A late general season for bucks in November, with some antlerless opportunity for youth, seniors, and hunters with disabilities.
- 3) Early (September) and late (November-December) archery seasons for either-sex or antlerless deer, or 3-point minimum bucks.
- 4) Early (September) and late (November-December, with a limited number of GMUs) muzzleloader seasons for either-sex or antlerless deer, or 3-point minimum or any bucks.
- 5) A late (December) general season for antlerless deer in a limited number of GMUs.

- 6) A substantial number of special permits are offered for antlerless or any deer, with a more limited number of late season buck special permits for quality hunts.
- 7) Tribal either-sex seasons held by the Colville, Spokane, Umatilla, and Nez Perce tribes.

#### *Columbian white-tailed deer*

This subspecies is state and federally listed as endangered in Washington. Information on population size and distribution is presented in Chapter 6, Section C.

#### *Mule Deer*

Mule deer are distributed throughout eastern Washington (Figure 14). Total population size is unknown. Densities are currently highest in Okanogan County, but are probably declining there because of a long-term reduction in landscape carrying capacity (Fitkin and Heinlen 2010). Populations have also been declining in the southern Cascades since about 2003 due in part to the expansion of the exotic louse *Bovicola tibialis* (Bernatowicz 2010). Elsewhere, numbers appear to be stable or gradually increasing since the late 1990s (Nelson 2009, WDFW 2010b). Most mule deer in Washington undertake seasonal elevational movements and the species is considered more reliant on access to winter range than other deer in the state. Population levels are closely tied to winter severity and are sensitive to overharvest. The species is also more vulnerable than white-tailed deer to suburban sprawl, agricultural expansion, fire suppression, and ecological succession of younger-aged habitat. These factors suggest that mule deer in Washington may experience declining trends in the future.

Statewide harvest of mule deer showed a declining trend 2001 to 2010, averaging about 11,600 animals per year (WDFW 2008, unpubl. data). Current harvest management consists of:

- 1) An early general season in October for bucks having at least three antler points on one side.
- 2) Early (September) and late (November-December) archery seasons for antlerless deer or 3-point minimum bucks. Antlerless hunting is allowed during archery if population numbers can sustain the pressure. Currently, antlerless hunting is not offered in central Washington due to low mule deer numbers.
- 3) Early (September) and late (November-December) muzzleloader seasons primarily for 3-point minimum bucks, with a very limited number of GMUs open for late muzzleloader (November-December).
- 4) Antlerless special permits are offered when populations can sustain the pressure. A limited number of late season buck special permits are offered for quality hunts, mostly in Chelan, Okanogan, and Douglas counties.
- 5) Tribal harvest by the Colville, Spokane, and Yakama tribes.

#### *Black-tailed Deer*

Black-tailed deer occur throughout western Washington (Figure 14). No estimates of total population size exist, but harvest data suggest that densities are highest in Cowlitz, Lewis, San Juan, and portions of Thurston and Grays Harbor counties. Black-tailed deer numbers appear to be stable throughout their range in Washington (WDFW 2008). Some animals move elevationally in response to seasonal conditions, but the extent of this behavior is less than in either mule deer or white-tailed deer. Hairloss syndrome has had some localized impacts on abundance in recent

decades, but the effects are usually short-term. Habitat for black-tailed deer has been reduced in western Washington due to reductions in timber harvest, natural succession of aging timber stands, and expansion of human development. These changes are expected to result in a gradual decline in overall abundance in the future. Black-tailed deer readily hybridize with mule deer where their ranges meet in Washington, especially in the southeastern Cascades and parts of Klickitat County.

Estimated numbers of black-tailed deer harvested in Washington have declined over the past decade, with an average annual kill of about 13,600 animals between 2001 and 2010 (Nelson 2009; WDFW, unpubl. data). Current harvest management consists of:

- 1) Early (October) and late (November) general seasons primarily for bucks. Some GMUs are restricted to 2-point minimum bucks or either-sex deer.
- 2) Early (September) and late (November-December) archery seasons for either-sex deer, 2-point minimum bucks, or bucks only.
- 3) Early (October) and late (November-December) muzzleloader seasons for bucks only or either-sex deer.
- 4) Antlerless special permits are offered when populations can sustain the pressure. A limited number of late season special permits for bucks are offered for quality hunts.

### Moose

Numbers of moose in Washington increased from about 60 in 1972 to about 1,500-2,000 in 2007 (S. Zender and H. Ferguson, pers. comm. in WDFW 2008), corresponding to an average annual increase in population size of 9.6-10.5%. This growth is the result of greater moose density in prime habitats and colonization of animals into new areas. Moose primarily occur in Pend Oreille, Spokane, Stevens, Ferry, and Okanogan counties (Figure 15). They are occasionally recorded in Chelan, Lincoln, Whitman, and Whatcom counties, with a few dispersing animals documented in more distant areas. Small numbers of moose are in the process of colonizing the Blue Mountains in Asotin, Garfield, Columbia, and Walla Walla counties, but have not yet formed a breeding population there.

Moose generally occur above 3,000 feet in elevation (S. Zender, pers. comm.) and prefer dense thickets of willows and other hardwood shrubs that are frequently associated with 15-25-year-old clear cuts or thinnings on mesic sites (Shepherd and Base 2010). Forest successional conditions in northeastern Washington generally appear to be excellent for moose and will likely remain so over the next few decades, thus moose numbers are expected to continue at current levels or gradually increase for some time. Harvests are currently by permit only and have totaled about 90-120 animals annually in recent years (Shepherd and Base 2010; D. A. Martorello, unpubl. data). Moose occasionally become a nuisance or create problems for human safety, but agricultural damage has not been reported.

### Bighorn Sheep

Washington's population of bighorn sheep currently numbers about 1,670-1,740 animals distributed in 17 isolated herds distributed in the Cascades, northeastern Washington, and the Blue Mountains (Figure 16; WDFW 2010b). Herd size averages about 100 sheep and ranges from about 10 to 210. Populations are increasing in eight herds, stable in seven herds, and declining in two herds. The

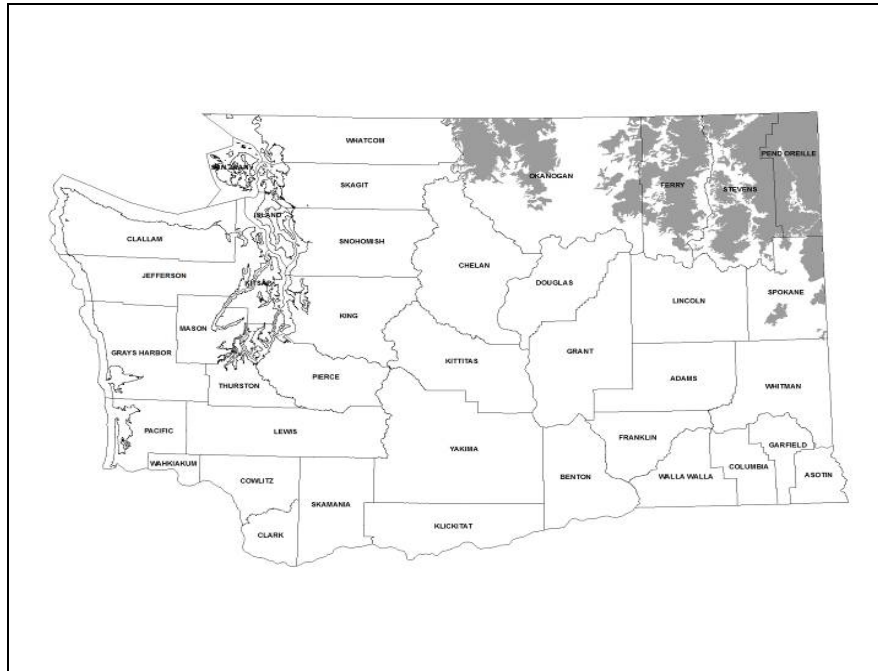


Figure 15. Primary distribution (shaded area) of moose in Washington.

statewide population estimate is beneath the desired objective of 1,750-2,130 sheep, which is based on potential habitat capacity (WDFW 2008). Diseases and parasites from domestic sheep are the primary causes for decline (e.g., Fowler and Wik 2010b), but many herds are also limited by habitat availability. Harvests are currently by permit only and have increased in recent years to 37 animals in 2010 (WDFW, unpubl. data).

### Mountain Goats

Mountain goat populations have been declining in Washington for many years. Current numbers total about 2,400 animals, with nearly all populations located in the Cascade and Olympic Mountains (Figure 17; Martorello 2010b). A few populations appear to be stable or slightly increasing, including those in the southern Cascades, along the north shore of Lake Chelan, around Mt. Baker, in the Methow region, and in the Olympics. Historical overharvest, impacts of timber harvest on wintering habitat, degradation and loss of alpine meadows, and increasing human recreational use and disturbance of alpine habitat likely have had the greatest negative impacts on abundance. Hunting opportunity and total harvest have decreased with falling populations. Harvests are currently by permit only and totaled 14 goats in 2010 (WDFW, unpubl. data).

### Mountain Caribou

Washington's population of mountain caribou is state and federally listed as endangered. Information on numbers and distribution is presented in Chapter 6, Section C.

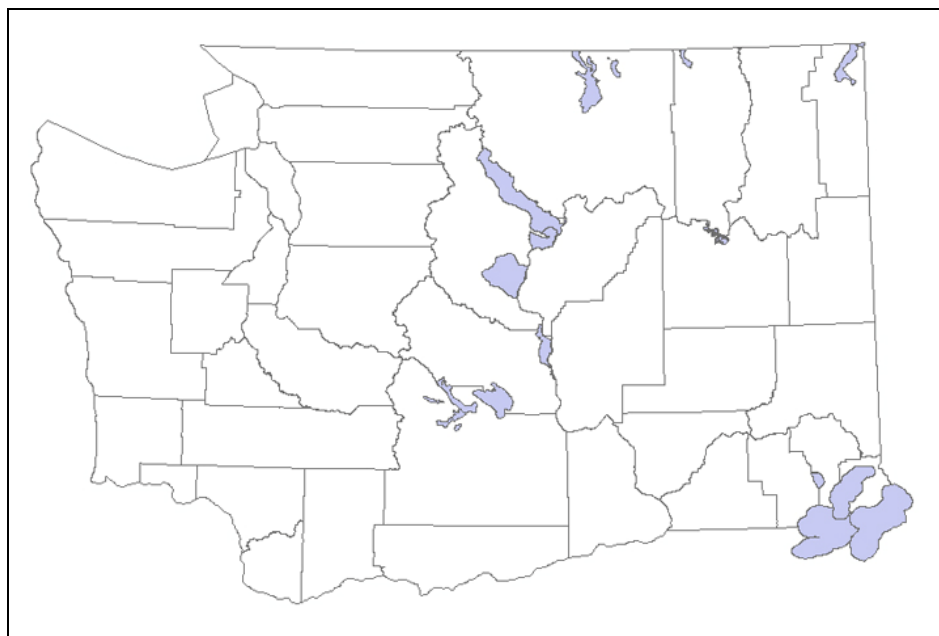


Figure 16. Distribution (shaded areas) of bighorn sheep in Washington.

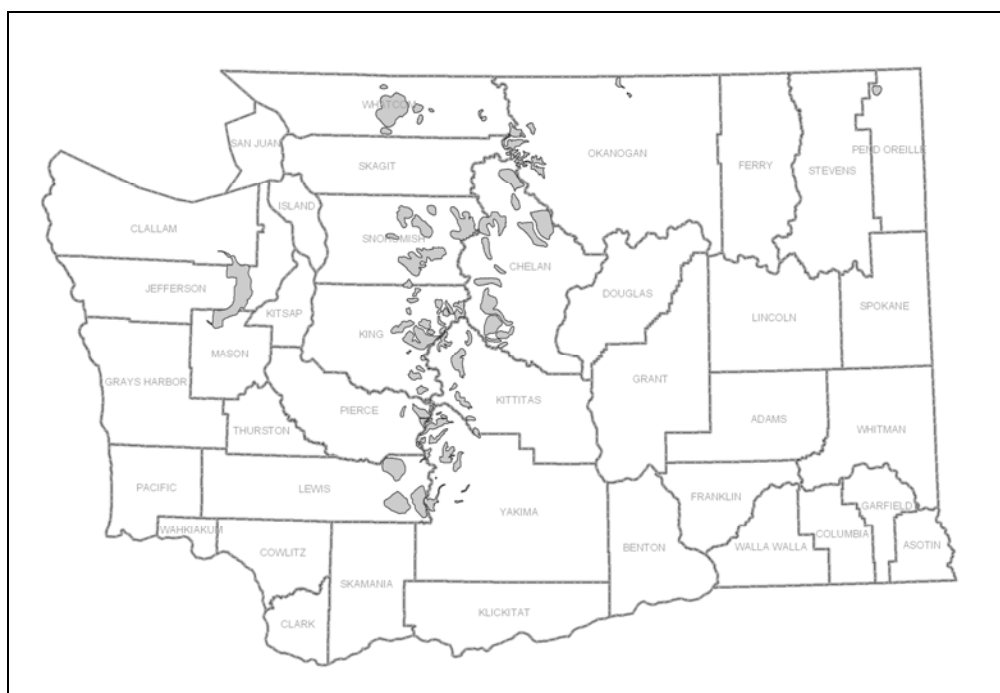


Figure 17. Approximate distribution (shaded areas) of mountain goats in Washington.

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**D. Wolf-Ungulate Interactions on Wintering Grounds**

WDFW is mandated by statute (RCW 77.36) to address damage to commercial agricultural crops, orchards, and vineyards caused by elk and deer, which occurs primarily in the winter. Two of the methods used to accomplish this have been fencing and supplemental winter feeding to keep animals at higher elevations away from agricultural sites. About 100 miles of 8-ft-tall elk-proof fence exist in Yakima and Kittitas counties and border nine permanent feeding stations. An additional 27 miles of elk fence run between the Wooten and Asotin Wildlife Areas in the northern Blue Mountains to segregate elk from agricultural lands. Fencing along Highway 97A north of Wenatchee is also being built to keep mule deer and bighorn sheep off the highway. WDFW conducts winter elk feeding operations at nine permanent feeding stations in Yakima and Kittitas counties. Feeding starts as soon as elk arrive in significant numbers (usually in December) and lasts until animals depart during spring green-up. An estimated 70% of the main Yakima sub-herd, or about 6,500-6,800 elk, is fed during typical winters (J. Bernatowicz, pers. comm.), although up to 90% of the sub-herd visits feeding sites during harsh winters with extreme snow depths. Sub-herd use of these feeding stations is predicted to gradually increase in the future. Up to 200 bighorn sheep also make use of one feeding site.

How wolves will interact with ungulates at fenced sites and winter feeding stations in Washington is mostly speculative. Fencing will likely impede ungulate escape and facilitate capture by wolves. Presence of wolves near feeding stations and at other fenced locations will probably increase management costs for WDFW (e.g., see discussion below for Wyoming). Reasons for this may include (1) increased fence maintenance if elk are pushed into or break through fences by wolf activity, (2) increased transport and manpower costs associated with hauling feed to more dispersed locations, (3) higher costs for conducting winter population surveys, and (4) changes in disposal or burial practices for elk carcasses at feeding stations. Some nearby landowners may also experience financial losses if wolves cause elk to break through fences and enter croplands. Furthermore, wolves could potentially follow elk onto farmlands, thereby possibly increasing wolf-livestock conflicts. These situations will be evaluated on a case-specific basis to determine if management responses are needed and, if so, what the responses should be (Chapter 12, Section 5.3).

Observations from winter feeding stations in Wyoming may be instructive for determining the types of interactions between wolves and elk that might occur at these locations in Washington. Dean et al. (2003) reported that wolf visitation increased from one of Wyoming's state-operated 22 feeding sites in 1999 to 14 sites by 2003. Total numbers of elk killed by wolves at these sites were insignificant when compared to herd size. In four of the five years between 1999 and 2003, wolves killed a total of fewer than 30 elk per year. Wolves tended to select for elk calves when hunting at feeding stations. Attempted predation by wolves sometimes temporarily displaced elk less than 3 miles from feeding sites for as long as a day. On occasion, elk moved up to 30 miles away and relocated to another feeding station, or were displaced onto private lands, where they created conflicts with livestock and landowners. None of the feeding sites were ever completely abandoned by elk during any given winter.

Elk at Wyoming feeding stations commonly responded to the presence of wolves by banding together in larger than normal herds, which increased potential competition between elk, damage to soil and vegetation, and possibly disease transmission (Dean et al. 2003). However, some management benefits were gained because elk diversified their use of feeding stations and moved

sooner to spring transitional ranges. The unpredictable movements of elk in response to wolf activity created logistical problems for the Wyoming Game and Fish Department, which needed to increase the amount of hay purchased and stored for the program. During mild winters, elk made less use of feeding stations and more animals were dispersed in the surrounding landscape. In response, wolf packs made fewer visits to stations and preyed more frequently on animals in poorer condition than those being fed. Wolf-elk interactions at Wyoming winter feeding stations have changed little since Dean et al.'s (2003) report (M. D. Jimenez, pers. comm.). Wolves continue to kill relatively small numbers of elk in and around the stations each winter, and incidences of surplus killing of elk are rare. Wolves and coyotes are known to key in on fence lines and follow them while searching for prey (M. D. Jimenez, pers. comm.). However, increased fence breaching by elk has not been noted in wolf-occupied areas in Wyoming and few if any fence-related injuries to elk have been recorded.

Winter feeding of elk and deer also occurs in Idaho, but on a much smaller scale than in Wyoming. Most sites operate infrequently or on an emergency basis. Wolves do visit some winter feeding stations, but have not caused significant losses or other problems at these locations to date (J. Rachael, pers. comm.).

#### **E. Predicted Levels of Wolf Predation on Ungulates in Washington**

Wolf diets in Washington are expected to be similar to those in Idaho, Montana, and Wyoming, with elk and deer being the primary prey species. Prey selection will likely vary among locations based on species availability and vulnerability, and variation in season, local terrain, and other factors. In areas of the state with few or no elk, deer will undoubtedly serve as the primary prey. Moose, which are widely distributed in northeastern Washington, may also contribute significantly to diets in that area. Predation on bighorn sheep and mountain goats will probably be minor. For mountain goats, range overlap with wolves is most likely to occur in the spring as wolves follow other prey to higher elevations and encounter goats still lingering in mid- to high elevation forests used during winter (C. Rice, pers. comm.).

It is difficult to predict with confidence the impacts that different population sizes of wolves will have on ungulate populations and hunter harvest in Washington. This is due largely to the many uncertainties involving where and how rapidly wolves become reestablished, their eventual abundance and diet composition, prey species behavior and population changes, hunter and agency responses, and other influences. For these reasons, the effects of wolf predation on ungulate populations are highly situation-specific (Garrott et al. 2005).

Keeping these limitations in mind, some general approximations of wolf predation levels are presented in Table 13 using dietary information from elsewhere in North America. Total populations of 50 and 100 wolves are expected to have minor overall impacts on Washington's ungulate populations. Fifty wolves may kill about 425-630 elk and 700-1,050 deer per year, with annual take doubling for 100 wolves (see Table 13 for an explanation of these estimates). These levels of predation could result in noticeable effects on elk and deer abundance in some localized areas occupied by wolf packs, but should not have broad-scale impacts. These levels of loss potentially represent 1-2% of the state's elk population and less than 1% of the combined deer population. With larger populations of wolves, greater numbers of ungulates would be removed

Table 13. Projected numbers of elk and deer that may be killed annually by four different population size categories of wolves in Washington. As described in Section A of this chapter, these estimates may not be accurate because they are based only on winter kill rates when predation rates are highest. They also fail to consider the number of fawns, elk calves, and supplementary prey eaten. Because of these reasons and the absence of biological data on wolves living in Washington, numbers presented here should be considered as very rough approximations.

Number of wolves present	Population size category			
	50	100	200	300
Estimated total no. of prey killed per year <sup>a</sup>	1,130-1,675	2,260-3,350	4,520-6,700	6,780-10,050
Estimated no. of elk killed per year <sup>a</sup>	425-630	850-1,260	1,700-2,520	2,550-3,780
Estimated no. of deer killed per year <sup>a</sup>	705-1,045	1,410-2,090	2,820-4,180	4,230-6,270

<sup>a</sup> Numbers represent the estimated range in numbers of prey killed by different sizes of wolf populations based on (1) an average winter kill rate of 7.2 kg/wolf/day (derived from Table 5.5 in Mech and Peterson [2003]) plus or minus 20%, (2) average body weights of 150 kg per elk and 60 kg per deer, and (3) a diet of 60% elk and 40% deer by biomass (see Table 2). Because of the large differences in body weight between elk and deer, fewer elk than deer are expected to be killed. Estimates given here are based on an average annual kill rate of 8.5-12.6 elk and 14.1-20.9 deer per wolf, or about 22.6-33.5 ungulates total per wolf.

annually, with perhaps 1,700-3,800 elk and 2,800-6,300 deer taken if 200-300 wolves became reestablished (Table 13).

Populations of 50 to 100 wolves should have few negative effects on big game hunting in Washington, as demonstrated by the relatively small estimated take of ungulates described above (by comparison, Washington hunters kill about 7,900 elk and 38,600 deer annually). As noted elsewhere (Creel and Winnie 2005, Mao et al. 2005, Proffitt et al. 2009), wolves may also cause some redistribution of game, which could make these species somewhat less vulnerable to hunter harvest. However, these impacts together would be restricted to the relatively few areas occupied by packs during the early to middle stages of recovery and would probably not reduce statewide harvests of elk and deer by more than 1-3%. Larger wolf populations would be expected to have greater impacts on game and hunting opportunity, but such impacts become increasingly difficult to predict or measure. To accommodate larger elk and deer losses from wolves, reductions in antlerless take and perhaps other restrictions such as shortened hunting seasons or reduced availability of special permits may be needed in some areas where wolves become common. Additional discussion of wolf-related impacts on hunter harvest and hunting revenue is presented in Chapter 14, Section C.

## F. Management of Wolf-Ungulate Interactions in Washington

Wolves are expected to inhabit areas of Washington with abundant prey that already support multiple species of predators and recreational hunting. The effect on ungulate populations from adding wolves to existing predation levels and hunter harvest is difficult to predict, but information from other states with wolves suggests that wolves will have little or no effect on elk and deer abundance or hunter harvest across large areas of Washington. While wolves have been linked to declining elk herds in some areas, they are often one of several contributing factors (e.g., increasing populations of other predators, changes in habitat, severe winter weather, and drought) affecting the herds, as described in Section B of this chapter.

Maintaining robust prey populations will benefit wolf conservation in Washington by providing adequate prey for wolves, supplying hunters and recreational viewers of wildlife with continued opportunities for hunting and seeing game, and reducing the potential for livestock depredation. Implementation of WDFW game management plans for ungulates (WDFW 2001a, b, 2002a-d, 2005b, 2006 a-c, 2008, 2010) should result in achieving healthy population objectives for elk, deer, and other species. This goal would be accomplished primarily through habitat improvement, harvest management, and minimizing illegal hunting (see Chapter 12, Task 5, for more detail). Harvest objectives may need to be adjusted if overall predation levels increase, and they should be compatible with long-term sustainable populations of predators and prey.

During recovery stages, while wolves are listed in Washington, it is unlikely that they will have a significant negative effect on ungulate populations in the state. However, if WDFW determined that wolf predation was a primary limiting factor for an “at-risk” ungulate population, and the wolf population in that wolf recovery region was healthy (i.e., it exceeds the delisting objectives for that recovery region), WDFW could consider reducing wolf abundance in the localized area occupied by the ungulate population before state delisting occurs.

For the purposes of this plan, an at-risk ungulate population is any federal or state listed ungulate population (e.g., Selkirk Mountain woodland caribou, Columbian white-tailed deer), or any ungulate population for which it is determined to have declined 25% or more below management objectives for three or more years and population trend analysis predicts a continued decline. For populations for which numeric estimates and/or management objectives are not currently available, it will not be possible to use a specific threshold to assess a need for management action. Instead WDFW will use other sources of information related to the population, such as harvest trends, hunter effort trends, sex and age ratios, and others.

Under this form of management, wolves would be controlled by moving them to other areas, through lethal control, and/or with other control techniques. While wolves are recovering, non-lethal solutions will be prioritized to be used first. Before deciding to proceed with this type of management, WDFW would consider the status of wolves statewide as well as within the specific wolf recovery region where the ungulate impact was occurring. The extent of wolf control undertaken would not be sufficient to push the region’s overall wolf population below delisting objectives and put it at risk. Management decisions of this type would be based on scientific principles and evaluated by WDFW.

Authority for the “take” of wildlife exists with the director of WDFW under state law RCW 77.12.240.

WDFW used the population persistence model (Appendix G) to evaluate the effect of conducting wolf management in response to ungulate population concerns when recovery objectives for delisting had been met in one wolf recovery region, but not in the other two regions (Appendix H, scenarios 6-9). All of the scenarios used the Eastern Washington recovery region, which has the smallest number of potential territories, as the example of a region that had met recovery objectives. All scenarios assumed that 1 of the 5 breeding pairs in Eastern Washington was in the Blue Mountains. Scenarios 6 and 8 evaluated the effects statewide, whereas scenarios 7 and 9 evaluated the effects within the region.

1 The resulting analyses suggested that under scenarios 6 and 8, the proposed option to manage  
2 wolves in the Eastern Washington recovery region before achieving statewide delisting was not likely  
3 to inhibit the ability to achieve recovery statewide, in all three regions, over time. Within the Eastern  
4 Washington recovery region, under scenario 7, with immigration, there was some risk (7%) of not  
5 achieving recovery within the recovery region. Under scenario 9, with no immigration, there was a  
6 much higher risk (48%) of failing to achieve recovery in the Eastern Washington recovery region.

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## 6. WOLF INTERACTIONS WITH OTHER SPECIES

This chapter describes potential interactions between gray wolves and other species, including federal and state listed species. With the prospect of wolves entering Washington, much of the overall discussion and concern about wolves has centered on interactions with livestock and ungulates. However, wolves will also interact with a host of other species, including other carnivores such as cougars and coyotes, as well as other mammals and birds. Many of these interactions will have immediate implications for either wolves or the species in question; other interactions may be more subtle, long-term, and difficult to directly relate to wolves. As with livestock and ungulates, the extent of wolf-related impacts on non-prey species and ecosystems in Washington will depend on where and how many wolves eventually inhabit the state. Many of the effects of wolves described in this chapter are likely density dependent, with less dense wolf populations creating fewer impacts than populations at carrying capacity (Campbell et al. 2006).

This chapter of the plan provides:

- background on interactions between wolves and other carnivores (Section A)
- background on interactions between wolves and scavengers (Section B)
- background on potential interactions between wolves and listed or candidate species in Washington (Section C)

### A. Wolves and Other Carnivores

As with ungulates, gray wolves in North America and elsewhere have co-existed for centuries with a variety of other carnivore species in many different habitats. How different carnivores interact with wolves varies depending on the extent of dietary overlap, habitat, environmental conditions, and other factors. To date, no definitive research exists on the effects that wolves have on carnivore community structure or populations (USFWS 1994, Ballard et al. 2003). Information regarding the interactions between other carnivores and wolves is primarily observational and subject to interpretation when attempting to make predictions at the population or community level. Because wolves are wide-ranging and many carnivores are secretive in nature, collecting data on interactions is difficult. Observations to date suggest that wolves can reduce, or in rare cases eliminate, certain carnivores (such as coyotes) locally, but no evidence of long-term spatial partitioning of resources within an area has yet been detected (Ballard et al. 2003).

In Washington, wolves will share habitats occupied by a number of other carnivores, including cougars, coyotes, black bears, grizzly bears, bobcats, lynx, red foxes, river otters, mink, martens, weasels, skunks, wolverines, badgers, raccoons, and fishers. Direct interactions almost certainly will occur as wolves begin to reoccupy portions of their historical range in Washington and reestablish packs. A review of the scientific literature offers clues to what may occur in Washington when wolves interact with the carnivore species noted above.

#### Cougars

Cougars and wolves both rely on ungulates as their main food source, but use different hunting techniques. Wolves hunt in packs and generally course or test prey, whereas cougars are solitary

1 hunters and rely on ambush of unsuspecting prey. Few observations of direct wolf-cougar  
2 interactions have been reported, but the two species do occasionally kill each other. Although  
3 cougars and wolves are similar in size, wolves tend to be dominant because of their pack social  
4 structure, which gives them a competitive advantage with cougars (Ruth and Murphy 2010). Wolves  
5 have been noted to kill kittens, subadults, and adult cougars in Glacier and Yellowstone national  
6 parks (White and Boyd 1989, Boyd and Neale 1992, Ruth 2004a, 2004b, Ruth and Buotte 2007).  
7 Reports of cougars killing wolves are rare and usually involve cougars killing solitary wolves (e.g.,  
8 Jimenez et al. 2008).

9  
10 During winter, wolves and cougars often occupy the same range and may have similar diets (Kunkel  
11 et al. 1999, Husseman et al. 2003, Akenson et al. 2005, Kortello et al. 2007), but wolves may be more  
12 likely to select younger prey or prey in poorer condition (Husseman et al. 2003). Cougars have been  
13 noted moving away from kills to avoid wolf contact (Akenson et al. 2005) and in general may avoid  
14 areas recently used by wolves (Kortello et al. 2007). Wolves also seek out and take over cougar kills,  
15 which may force cougars to increase their kill rates to replace lost prey (Hornocker and Ruth 1997,  
16 Murphy 1998, Kunkel et al. 1999, Kortello et al. 2007, Hebblewhite and Smith 2010). In one area of  
17 central Idaho, cougars showed lower recruitment, fewer adults, and a disrupted social structure  
18 several years after recolonization by wolves, but other factors (declining prey populations, high  
19 hunter harvest, and a large forest fire) occurring simultaneously probably contributed to these effects  
20 (Akenson et al. 2005).

21  
22 Recent information from Yellowstone National Park indicates that cougar abundance there has  
23 declined slightly since the reestablishment of wolves and that cougars now focus more of their  
24 hunting behavior in denser habitats that are more conducive to their hunting style (K. Murphy,  
25 unpubl. data). In one area of Banff National Park, Alberta, a largely wolf-related decline in the elk  
26 population resulted in cougars shifting their diets toward mainly deer and bighorn sheep (Kortello et  
27 al. 2007). Cougars also exhibited low annual survival and poor body condition during the period of  
28 wolf reestablishment. Thus, cougars were negatively affected by wolf recolonization (Hebblewhite  
29 and Smith 2010). Griffin et al. (2011) reported substantially lower rates of cougar predation on  
30 young elk calves in ecosystems with wolves.

### 31 32 Bears

33  
34 Ballard et al. (2003) summarized wolf-bear interactions in North America. Most reported  
35 encounters between wolves and black bears involved fighting or chasing one another, or wolves  
36 killing black bears. In a smaller number of interactions, wolves displaced black bears from kills.  
37 Wolves will seek out and kill black bears in their dens but often do not consume them, suggesting  
38 that interference competition exists between the two species. One observation of a black bear  
39 killing a wolf has also been made.

40  
41 Most wolf-grizzly bear interactions involve fighting and chasing, which often take place at kill sites  
42 (Ballard et al. 2003). Encounters at kill sites usually appear to be won by grizzlies, whereas wolves  
43 usually win those at wolf dens. Both species occasionally kill one another (e.g., Jimenez et al. 2008,  
44 Hebblewhite and Smith 2010). Because grizzlies readily usurp ungulate kills made by wolves (e.g.,  
45 Hebblewhite and Smith 2010), Servheen and Knight (1993) speculated that the presence of wolves  
46 might be beneficial to threatened populations of grizzlies by supplementing their diet with greater  
47 amounts of protein through increased availability of ungulate carcasses. This may be especially true

following mild winters, when ungulate carrion is normally far less available. However, at Banff National Park, wolves were three times more likely to take over grizzly kills than to lose their own kills to grizzlies, indicating that wolves may out-compete grizzlies at some locations (Hebblewhite and Smith 2010).

### Coyotes

Interactions between wolves and coyotes have been discussed in the scientific literature more often than for other carnivores. Reestablishment of wolves has led to reductions in coyotes in some areas (e.g., Yellowstone and Grand Teton National Parks), but not at others (Ballard et al. 2003). Extirpation of coyotes by wolves can occur rarely (e.g., at Isle Royale National Park; Krefling 1969), but probably only under limited ecological circumstances, such as where immigration is prevented. Recent studies at Grand Teton and Yellowstone national parks have detected declines in coyote densities of 33% and 39%, respectively, in areas reoccupied by wolves and are reflective of competition between the two species (Berger and Gese 2007). Localized or short-term decreases in coyote abundance can be even higher, such as a 50% loss in the Lamar Valley population of Yellowstone from 1996 to 1998 (Crabtree and Sheldon 1999).

In contrast to these locations, Berger and Gese (2007) hypothesized that wolves may have little or no effect on coyote densities outside of protected areas (where overall wolf densities are likely to be lower because of conflicts with humans), although this observation was based on few data. Transient coyotes are especially vulnerable to wolves and exhibit poorer survival and greater rates of dispersal when wolves are present (Berger and Gese 2007, Berger et al. 2008). Although records of wolves killing coyotes are common in the literature (e.g., Seton 1929, Young and Goldman 1944, Carbyn 1982, Thurber et al. 1992, Ballard et al. 2003), coyote mortality from wolves is usually fairly low (3-16%; see Berger and Gese 2007, Merkle et al. 2009). Wolf-coyote interactions typically occur near wolf kills as coyotes attempt to scavenge ungulate carcasses (Crabtree and Sheldon 1999, Merkle et al. 2009, Atwood and Gese 2010).

Switalski (2003) found that coyotes quickly learn to avoid interactions with wolves by becoming more vigilant and waiting to feed at carcasses until after wolves have departed. Other behavioral changes by coyotes, such as denning closer to roads and reducing their vocalizations, presumably also help avoid detection by wolves (Switalski 2003). Additionally, increased group size makes coyotes less susceptible to wolf-caused mortality (Merkle et al. 2009, Atwood and Gese 2010). Resident coyote home ranges often overlap extensively with those of wolves, suggesting that coyotes may in fact derive some benefit from wolves by having a year-round source of ungulate carcasses on which to scavenge (Arjo et al. 2002, Switalski 2003, Berger and Gese 2007, Merkle et al. 2009). Carrera et al. (2008) hypothesized that competition between the two species may be especially high where their diets substantially overlap. In western Montana, wolves and coyotes feed on similar prey and exhibit extensive overlap of annual home ranges (Arjo and Pletscher 1999, Arjo et al. 2002, Atwood and Gese 2010). Wolves and coyotes may be able coexist in this region by partitioning prey resources by age and size class, by coyotes exploiting alternative prey during summer and scavenging during winter (Arjo et al. 2002), and by coyotes changing their behavior, resulting in spatial and temporal separation from wolves (Arjo and Pletscher 1999, Atwood and Gese 2010).

### Other Carnivores

Wolves can affect some other carnivores, such as wolverines, red foxes (including Cascades red foxes), and fishers, in the same ways described above for bears and coyotes (Ballard et al. 2003). Increased availability of wolf-killed carcasses may benefit these species by providing more food for scavenging, particularly during the winter months (e.g., van Dijk et al. 2008). However, wolves sometimes kill these species during direct interactions. In Wisconsin, a fisher apparently killed by a wolf has been reported and fisher abundance has declined in regions of the state occupied by wolves (A. P. Wydeven, pers. comm.). In areas where coyote abundance is reduced by wolves, predators such as red foxes, lynx, and bobcats may benefit from reduced competition with coyotes (Mech and Boitani 2003b). Additionally, some prey species of coyotes may increase, which has the potential to enhance populations of other medium-sized and small carnivores (Buskirk 1999).

It is doubtful that wolves will greatly affect the overall numbers or distribution of other carnivore species in Washington. However, the presence of wolves likely will change the local distributions and behaviors of some carnivores as they attempt to avoid direct interactions with wolves or as they respond to changes in food availability. Such changes could favor some carnivore species over others.

### **B. Wolves and Scavengers**

Increased availability of wolf-killed carcasses can benefit a number of vertebrate and invertebrate scavenging species (Hebblewhite and Smith 2010). Many vertebrates benefit especially during winter when other foods become scarcer (Smith et al. 2003). At Yellowstone National Park, at least 12 vertebrate species scavenge at wolf-killed carcasses, with five (bald and golden eagles, coyotes, ravens, and magpies) visiting nearly every kill (Wilmers et al. 2003a, 2003b). At Banff National Park, at least 20 vertebrate species fed off wolf kills, with ravens, coyotes, magpies, martens, wolverines, and bald eagles visiting most often (Hebblewhite and Smith 2010).

### **C. Wolves and Listed/Candidate Species**

Gray wolves are likely to have few significant adverse impacts on any current federal or state listed (endangered, threatened, sensitive) or candidate species (see Appendix A) in Washington in the foreseeable future, with the possible exception of mountain caribou. Interactions with listed or candidate carnivores and birds of prey (i.e., grizzly bears, lynx, wolverines, fishers, Cascades red foxes, bald eagles, and golden eagles) are briefly discussed in Sections A and B.

Washington's only population of mountain caribou, the Selkirk Mountains herd, spends most of its time in the British Columbia portion of its range, with members infrequently entering Washington. The herd increased from 33 caribou in 2004 to 46 caribou in 2009. Distribution in Washington is restricted primarily to the Salmo-Priest Wilderness Area in northeastern Pend Oreille County. The area is characterized by high elevations and extensive closed canopy forests, and therefore supports relatively low densities of other ungulate species. Hence, few wolves are expected to reside in the Salmo-Priest, meaning that predation on caribou would probably occur infrequently. Nevertheless, any wolf-related losses to the herd would have a significant impact on the population.

Recent declines of woodland caribou populations in British Columbia have been linked to the expansion of moose and the subsequent increase of wolves, which has resulted in greater predation on caribou (Wittmer et al. 2005, Stotyn et al. 2007). To reduce the threat of predation, woodland caribou attempt to isolate themselves from predators and other more abundant prey species by selecting old forests and alpine areas, and avoiding areas near roads during all seasons (Stotyn et al. 2007). However, loss of mature forests and fragmentation of winter habitat may compromise this strategy. Habitat overlap between caribou and wolves is greatest in the spring and calving season, resulting in increased risk of predation for caribou. Localized reductions of specific wolf packs and other large predators have been used to reduce the impact of predation on mountain caribou populations in the province (G. Mowat, pers. comm.), but regular use of this type of management may carry unacceptable ethical implications for the recovery of rare species in the United States (Wittmer et al. 2005).

The population of Columbian white-tailed deer occurring along the lower Columbia River in Washington (in Wahkiakum and Cowlitz counties; Figure 14) and Oregon numbered about 600 animals in 2009, including about 235 animals in Washington (Meyers 2009). Coyote predation is the primary cause of fawn mortality and may limit the population (USFWS 2010b). Wolf predation levels that might occur in the future if the two species overlap are difficult to predict, but could potentially harm this deer's recovery in Washington. However, if wolves were to reduce coyote abundance in the area occupied by the deer, this could result in lower overall predation rates on the deer.

Golden eagles and bald eagles may both benefit from the presence of wolves through greater availability of wolf-killed ungulate carcasses, especially during winter. Golden eagles in particular may currently be food limited because of declines in jackrabbits and perhaps other prey species in Washington (J. Watson, pers. comm.).

Wolves feed on many different small prey species (e.g., mice, tree squirrels, muskrats, woodchucks, grouse, songbirds; van Ballenberghe et al. 1975, Fritts and Mech 1981, Boyd et al. 1994, Arjo et al. 2002), especially in the summer when ungulates become less available, but small prey never comprises a significant portion of the diet. A number of listed and candidate species in Washington fall into this size category and might be rarely caught and eaten by wolves. These include Merriam's shrew, pygmy rabbit, white-tailed jackrabbit, black-tailed jackrabbit, western gray squirrel, Washington ground squirrel, Townsend's ground squirrel, Mazama pocket gopher, gray-tailed vole, greater sage-grouse, and sharp-tailed grouse. Many of these species occur in open habitats (i.e., shrub-steppe, grasslands, prairies, farmland) that are unlikely to be recolonized to any significant extent by wolves in Washington.

Although not state or federally listed, Olympic marmots have been declining in recent years and are now estimated to total fewer than 1,000 animals (Griffin et al. 2008). Coyote predation is probably the main threat to the species (S. C. Griffin, pers. comm.). Coyotes were historically rare or absent from the Olympic Peninsula when wolves were widespread in western Washington (Taylor and Shaw 1929, Scheffer 1995). Although recolonization of the Olympic Mountains by wolves might result in additional predation pressure on Olympic marmots, it more likely could benefit marmots by reducing coyote abundance.

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## 7. WOLF-HUMAN INTERACTIONS

Because of the long absence of gray wolves from Washington, most people in the state are unfamiliar with wolves and wolf behavior. Addressing public safety concerns and providing information on wolf behavior are important steps in achieving conservation and tolerance of wolves by citizens.

This chapter of the plan provides:

- background on wolves and human safety (Section A)
- discussion on interactions between wolves and the public in Washington (Section B)
- background on interactions between wolves and dogs (Section C)
- discussion on management of conflicts between wolves and pet dogs in Washington (Section D)
- background on wolf hybrids and pet wolves (Section E)
- background on wolves and tapeworm disease (Section F)

### A. Human Safety

#### Background

Wild wolves generally fear people and rarely pose a threat to human safety. Attacks on humans by wolves are quite rare compared to those by other species. Since 1950, wolves are known to have killed nine people in Europe, where current wolf numbers total 10,000-20,000, and eight people in Russia, where about 40,000 wolves exist (Linnell et al. 2002, Boitani 2003). Human deaths have also been reported in India, where conditions have deprived wolves of wild prey and livestock are heavily guarded (Fritts et al. 2003). In North America, where there are about 60,000 wolves, two human deaths have been attributed to wolves in the past 60 years (Linnell et al. 2002, Boitani 2003, NPS 2003, McNay 2007). One occurred in Saskatchewan in 2007 and the other in Alaska in 2010. The first death apparently involved habituated wolves being fed by people or attracted to garbage.

Injuries from wolves have also been extremely rare in North America (Linnell et al. 2002, McNay 2002a, 2002b). By comparison, domestic dogs in the United States are responsible for 4.7 million bites resulting in 500,000-800,000 hospital visits and 15-20 fatalities per year (Sacks et al. 1996, Centers of Disease Control 2003). Dogs are also the single most important vector for the transmission of rabies to humans (Moore et al. 2000).

Annual numbers of interactions between humans and other wildlife species in the United States average about 27,000 bites/injuries and an unknown number of fatalities by rodents, 8,000 bites/injuries and 15 fatalities by venomous snakes, 750 bites/injuries by skunks, 500 bites/injuries by foxes (Conover 2001), and 40-50 fatalities by bees (Cyr and Johnson 2006). Among other large carnivores, grizzly/brown bears killed about 36 people in Europe, 206 in Asia, and 71 in North America during the 20th century (Swenson et al. 1996). An estimated 25 attacks by black bears occur annually in North America (Conover 2001), with an average of almost two fatal attacks per year from 2000 to 2009 (Herrero et al. 2011). For cougars, there were 17 fatal and 72 injurious

attacks from 1890 to 2001 in North America (Beier 1991; L. Fitzhugh unpublished data in Linnell et al. 2002).

About half of the human fatalities from wolf attacks worldwide since about 1950 have involved wolves infected with rabies (Linnell et al. 2002). Wolves are not a reservoir of rabies, but contract it from contact with other wildlife harboring the disease. The severity of sporadic attacks by rabid wolves in Europe and Asia in past centuries likely contributed to a perception brought to North America by European settlers that all wolves were violently dangerous animals. However, in the United States and Canada, interactions involving rabid wolves and humans have rarely occurred due to the low overall incidence of rabies on the continent (Linnell et al. 2002). No such cases have occurred in Idaho, Montana, or Wyoming since the reestablishment of wolves in the 1980s (Linnell et al. 2002, McNay 2002a, 2002b; E. Bangs, pers. comm.).

Attacks by non-rabid wolves typically involve captive wolves, healthy wild wolves that became habituated to humans (with or without food being present), territorial attacks by wolves on pet dogs where the dog owner tried to intervene, defensive attacks by wolves when trapped or cornered or when den sites with pups were threatened, wolves acting as predators under unique circumstances, and wolf-dog hybrids (Linnell et al. 2002, McNay 2002a). In the 33-year period from 1969 to 2001, 28 reports of unprovoked aggression by wolves were documented in North America (Linnell et al. 2002, McNay 2002a, 2002b). Nineteen of these involved wolves habituated to humans and five involved people accompanied by dogs. The dogs may have been the primary reason for the wolves' aggression, with attacks on the people occurring secondarily. An unusual number (at least eight) of wolf-human encounters, including several attacks, occurred in Ontario in 2006-2007, but many of these apparently involved animals habituated to people (Grooms 2007). There have been no physical attacks on people by wolves in Idaho, Montana, or Wyoming from the time wolf recovery began in the 1980s until the present.

McNay (2002a) reported a substantial increase in unprovoked aggression by wolves toward humans from 1969 to 2000, as compared with 1900 to 1968, and noted that this corresponded with increased protections for wolves, larger wolf populations, and greater numbers of humans visiting parks and other areas inhabited by wolves. As with other wildlife species, these factors provided more opportunities for wolves to become conditioned to humans and their foods.

Habituation of wolves to humans can occur in locations where wolves commonly encounter people and may or may not involve conditioning to human foods (McNay 2002a, NPS 2003). Instances of camp robbing by wolves have long been known (Young and Goldman 1944) and may develop from wolves finding novel or chewable items (e.g., camping equipment, clothing) on a repeated basis in a human setting. This type of conditioning does not involve the presence of food, but can nevertheless lead to unprovoked aggression toward humans (see Linnell et al. 2002 for examples). Wolves can quickly develop persistent aggressive approach behavior in situations where they receive food directly from people (McNay 2002a). Habituated wolves can remain non-aggressive toward humans for extended periods, but can quickly transition to strong aggressive or predatory behavior depending on the behavioral stimuli shown by humans (McNay 2002a).

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### Avoidance of Close Encounters with Wolves

Because wolves are large carnivores capable of inflicting serious injury to people, wolves should be respected for their capabilities and humans should avoid close contact at all times. Wolves are best left wild and observed from a safe distance. Wolves can gradually lose their fear of people through increasingly frequent contact and receiving food rewards for their boldness (NPS 2003, MFWP 2007a). Bold wolves are more likely to approach humans and human-populated areas when positively rewarded for doing so.

To prevent wolves from becoming habituated, people should:

- Resist the temptation to approach wolves.
- Not approach fresh wolf kills, dens, or rendezvous sites.
- Not entice or allow wolves to come nearby.
- Not feed wolves or other wildlife, or leave food outdoors, including pet food.
- Keep garbage in a secure location.
- Not let wolves become comfortable near human-inhabited areas.
- Notify authorities about wolves that seem comfortable around people, seek human food, or frequent human areas. Early intervention can keep a problem from getting worse.

During a close encounter with a wolf, people should do the following to frighten the animal away:

- Stand tall and make themselves look larger.
- Act aggressively towards it -- make noise, throw objects, and wave clothing.
- Calmly but slowly back away and maintain eye contact.
- If the wolf does not run away immediately, continue making themselves large, keeping eye contact, and backing away.
- Not turn their back on the wolf or run away.

The federal Endangered Species Act provides that “...any person may take endangered wildlife in defense of his own life or the lives of others” (50 CFR 17.21(c)(2)). State law also makes it permissible to kill “...wild animals engaged in the physical act of attacking a person” (Chapter WAC 232-36-050(3)(a)). It is important to understand that wolves passing near, watching, or otherwise behaving in a non-threatening way near humans should not necessarily be considered as dangerous. Under these circumstances, wolves could and should be hazed using non-lethal methods; use of lethal force is unneeded and illegal.

### **B. Interactions with the Public**

In Washington, various groups of people with a higher than average likelihood of coming in contact with wolves in the wild include, but are not limited to, hunters, trappers, rural residents, recreationists, outfitters and guides, forest workers/contractors, other natural resource workers, and utility workers. Some members of these groups may welcome seeing wolves and may seek them out, while others may consider wolves as problematic to their activities. Regardless, user groups should be informed about wolves. To reduce concerns over safety, efforts should be made to inform rural residents and backcountry users of ways for reducing the likelihood of encounters with wolves and methods for preventing habituation toward people. Strategies for accomplishing this are presented

in greater detail in Chapter 12, Tasks 6 and 9, and will be essential to achieving the conservation and management goals for wolves.

### C. Interactions with Domestic Dogs

Situations where wolves and domestic dogs encounter each other can result in deaths and injuries to dogs. Attacks on dogs are usually related to defense of pups at dens or rendezvous sites or defense of territories rather than acts of predation (Bangs et al. 2005a, Ruid et al. 2009). Wolves killed at least 144 dogs in Idaho, Montana, and Wyoming from 1987 to 2010 (Table 5) and at least 385 dogs in the Great Lake States from 1979 to 2008 (Table 6). Dogs used for livestock guarding, herding, and hunting are the most vulnerable to attack, but pet dogs are also at some risk (McNay 2002b, Treves et al. 2002, Bangs et al. 2005a, Edge et al. 2011). None of the dogs killed in Idaho, Montana, and Wyoming through 2006 were accompanied by their owners at the time of attack (USFWS 2007b). Most attacks on dogs in these states occur in remote areas away from homes (Bangs et al. 2005a), but in a few cases, wolves have come close to homes to fight with dogs, even when people were present close by. Domestic dogs are also vulnerable to attack or killing by a variety of predators other than wolves, including coyotes, cougars, bears, and feral dogs. Wolf predation on domestic dogs in upper Michigan occurs in all months of the year except February and November (Edge et al. 2011).

As wolves expand their range in Washington, dog owners will need to be aware of the potential risks to their animals if they are within wolf pack territories. Some wolves will occupy areas near human habitation and areas used recreationally (e.g., national forests), which could put hunting or pet dogs at risk of depredation, especially if they are running at large.

In areas occupied by wolves, homeowners with dogs should:

- Not leave their dogs outside overnight unless they are kept in a sturdy kennel.
- Avoid letting their dogs outside for bathroom breaks after dark except in areas with good lighting or fencing.
- Keep dogs on a leash or in visual/auditory range on walks and vocalize regularly including use of whistles.
- Not allow dogs to roam at large. Dogs running loose may attract wolves.
- Train their dogs not to chase or approach wildlife, and to return on command.
- Not leave dog food outside at night.
- Avoid feeding wildlife near their home.

Hikers should consider leaving their dogs at home when visiting sites with wolves. Hikers with dogs should:

- Be able to recognize wolf sign.
- Bring a leash to restrain their dogs if wolves or wolf sign are encountered.
- Keep their dogs on leash when walking in known wolf habitat.
- Consider placing a bell on the dog's collar to alert wolves that people are also present.

Hikers with dogs that encounter a wolf should:

- Bring the dogs to heel at the person's side or put them on leash as quickly as possible.
- Stand between the dogs and the wolf, which often ends the encounter.

- Not attempt to break up a physical fight between a wolf and a dog, which could result in injury to the person.

#### Hunting Dogs

Recreational hunting for cougars, bears, and bobcats with hounds was banned in Washington by state initiative (I-655) in 1996. Through legislative authorization and exceptions provided in the initiative, hounds were used to pursue three game species in Washington from 2001 to 2010, including cougars in a pilot program for six counties (Pend Oreille, Stevens, Ferry, Okanogan, Chelan, and Klickitat), raccoons statewide, and black bears causing timber damage in western Washington (by permit only). Hounds used for hunting in areas occupied by wolves are susceptible to wolf attacks. In Idaho and Montana, one or two fatal attacks were reported in most years from 2000 to 2008, all involving dogs hunting cougars (USFWS et al. 2009 and older annual reports; S. Nadeau, pers. comm.). Hunting dogs appear to be more vulnerable to wolves in parts of the Great Lakes region, where for example as many as 23 hounds have been killed in a year in Wisconsin (Ruid et al. 2009). The majority of dog deaths in this region occur during bear hunts or dog training periods (Edge et al. 2011).

The six counties in northeastern and north-central Washington where hound hunting of cougars was authorized are among those likely to be recolonized by wolves in the future. If the use of hounds for cougar hunting is continued or reauthorized in the future, or where hound hunting of raccoons and bears continues, houndsmen should be trained on steps that can be taken to reduce interactions between their dogs and wolves. They should:

- Avoid releases in areas with fresh evidence of wolves.
- Release hounds only on fresh sign of the target species to avoid long chases.
- Yell or make noise when releasing hounds and going to the tree.
- Reach hounds at trees as quickly as possible so they are not unattended for long periods.
- Leash dogs at trees to control them.
- Place bells or beeper collars on hounds.

Hunters using dogs to locate forest grouse can reduce the risk of encounters between wolves and the dogs by keeping dogs within sight, placing a bell or beeping collar on those that range farther, talking loudly to dogs and other hunters, using a whistle, and placing dogs on leash if wolves or wolf sign are sighted.

#### **D. Wolf Hybrids and Pet Wolves**

Wolves are capable of hybridizing with other canid species and have been documented breeding with coyotes, domestic dogs, and feral dogs. However, behavioral differences between wolves, coyotes, dogs, and wolf hybrids usually keep the populations distinct. Possession of wolf hybrids and wolves as pets should be discouraged because of the potential threat to human safety. Hybrids and pet wolves are dangerous to people because of their physical strength, lack of shyness, and predatory instincts, which make their behavior unpredictable in many situations (Fritts et al. 2003). Hybrids and pet wolves killed at least 13 children and injured at least 43 others in North America from 1981 to 1999 (Linnell et al. 2002). Wolf hybrids and pet wolves regularly end up in the wild when their owners allow them to run free, abandon them, permanently release them, or when the

animals escape. Washington has had a number of instances of hybrids being killed on roads in vehicle collisions, or released in national forests or other areas. These are commonly reported as wolf sightings by the public.

Because wolf hybrids can be difficult to distinguish from wild wolves, negative encounters between humans and hybrids often are attributed to wild wolves and therefore can impede efforts to reestablish and conserve wolves. There is also potential for the genetic pollution of wild wolf populations, although the risk is low considering the poor survival of wolf hybrids released into the wild. Genetic evidence of hybridization between wolves and dogs or hybrids was recently described from Vancouver Island, British Columbia (Muñoz-Fuentes et al. 2010). A domestic dog mitochondrial DNA haplotype was detected in three females (2 adults, 1 immature) that were morphologically identified as wolves in 1986. The data suggested that a female dog or hybrid with dog mitochondrial DNA must have mated with a male wolf and produced at least one female offspring that subsequently reproduced. Muñoz-Fuentes et al. (2010) attributed this hybridization event to the small size of the wolf population and lack of available mates when wolves were recolonizing. Wolves were virtually eliminated from the island by 1950 as a result of eradication efforts, and slowly re-colonized from mainland British Columbia beginning in the mid to late-1970s. Their findings exemplify how small wolf populations are at risk of hybridization.

A state law (RCW 16.30) enacted in 2007 prohibits the ownership, possession, and breeding of pet wolves and other potentially dangerous wildlife species. Provisions of the law allowed current owners of pet wolves to retain their animals until the death of the animals and allow licensed facilities to possess wolves. The law is enforced by local animal control authorities and law enforcement officers or, in their absence, WDFW law enforcement officers. Although hybrids of all other species included in the law are prohibited, the law did not include wolf-dog hybrids. These animals are regulated as domestic dogs in Washington. WDFW has no jurisdiction over wolf hybrids. Authority to regulate the ownership, possession, and breeding of wolf hybrids currently lies with individual Washington counties and cities. King County, Tacoma, and Puyallup are among the jurisdictions that have adopted ordinances prohibiting possession of wolf hybrids (and wolves) as pets by private citizens. Wolf hybrids are commonly kept as pets in Washington, with an estimated 10,000 animals present in the state in the late 1990s (P. Joslin, pers. comm., cited in Gaines et al. 2000).

## **E. Tapeworm Disease and Wolves**

The parasitic tapeworm *Echinococcus granulosus* is found almost worldwide in canids (e.g., dogs, wolves, coyotes, and foxes) and has been recently detected in more than half of the wolves tested in Idaho and Montana (Foreyt et al. 2009). This tapeworm requires two hosts to complete its life cycle. Ungulates (e.g., deer, elk, moose, domestic sheep, pigs, and cattle) serve as intermediate hosts and become infected by ingesting tapeworm eggs while grazing. The eggs hatch into larvae, which form hydatid cysts in the lungs, liver, and other parts of the body. Canids usually are the final hosts and become infected by eating ungulates with cysts. Consumption of cysts releases larval tapeworms, which attach to the small intestine where they mature into adults. Adult tapeworms are 3-5 mm long and produce eggs that are shed in the final host's feces.

This tapeworm can rarely cause hydatid disease (or echinococcosis) in humans. People can obtain the disease by drinking water or eating vegetation contaminated with tapeworm eggs. Infections can

1 also result from handling contaminated canine fur or scat, and then transferring the eggs to the  
2 person's mouth by touching the face or eating before adequate hand washing. The disease is  
3 extremely unlikely to be spread by handling ungulate capes or meat, unless those parts are  
4 contaminated with canid feces and handlers do not use good basic hygiene. People cannot be  
5 infected by eating the cysts found in ungulates. These tapeworms are neither wind-born nor  
6 transmissible to humans in any way other than direct ingestion of eggs.

7  
8 To avoid infection, people should practice good hygiene when handling live wild animals, dead wild  
9 animals, their secretions, or their products. Dogs should not be allowed to feed on or scavenge  
10 ungulates (especially entrails), or allowed to roll in canine scat in geographic areas where the  
11 tapeworm occurs. People should always wash their hands after handling dogs with access to  
12 ungulate carcasses and regularly deworm the dogs.  
13

## 8. LAND MANAGEMENT

Gray wolves are habitat generalists and one of the most adaptable large predators in the world (USFWS 2009). They require only a sufficient year-round prey base and protection from excessive human-caused mortality. Wolf populations are able to persist in many parts of the world featuring greater human development than the northwestern United States (Boitani 2003). Even active wolf dens can be resilient to non-lethal disturbance by people (Thiel et al. 1998, Frame et al. 2007, Person and Russell 2009). In parts of the species' range (e.g., in northwestern Montana), wolf packs use a matrix of public, private, and corporate-owned lands where a variety of land uses occur, including dispersed outdoor recreation, timber production, livestock grazing, home sites within the rural-wildland interface, hobby farming/livestock, and even full-scale resort developments with golf courses.

Restrictions on human development and other land use practices have not been necessary to achieve wolf recovery in Idaho, Montana, and Wyoming (USFWS 2009), and the U.S. Fish and Wildlife Service did not designate critical habitat for wolves in the western United States. With the exception of some temporary area closures near den sites in national parks, there have been no restrictions on grazing methods, road use, timber management and logging, mining, recreation (e.g., camping, hiking, and backcountry horse use), public access, or other activities due to the presence of wolves. Outside of national parks, no wolf-related restrictions have been placed on public or private lands in Montana (C. Sime, pers. comm.).

Based on the habitat use and large home ranges of wolves in Idaho, Montana, and Wyoming, it is expected that wolves will use a matrix of public, private, and corporate-owned lands in Washington, but with primary occupancy on public lands (see Chapter 2, Section C, for further background on habitat use). In some areas, expanded use of private lands may occur in the winter as wolves follow their prey to lower elevations. As in Idaho, Montana, and Wyoming, wolf reestablishment is not expected to result in any additional land use restrictions in Washington.

### A. Federal Land

Responsibility for managing federal lands resides with the federal administering agencies. WDFW has no legal authority to implement land use restrictions on land it does not manage and land management agencies can and may adopt seasonal or localized area restrictions independently from WDFW. Therefore, it will be important for federal agencies and WDFW to coordinate on land use issues as they relate to wolf management, especially the administration of livestock grazing permits.

Wolf activity on national forest lands in Montana has not generally prompted any area closures or travel restrictions, primarily because recreational use of these lands is often dispersed and sporadic (MFWP 2003). Temporary area closures are sometimes established around occupied den or rendezvous sites in national parks because of the strong public desire to view wolves and the high visitation of areas with wolf activity that would otherwise occur. At Yellowstone National Park, areas around dens are closed until June 30, but at Glacier National Park, this type of seasonal closure has been implemented for only one wolf pack (MFWP 2003).

1 In Wyoming, the U.S. Fish and Wildlife Service always discouraged other agencies from placing any  
2 restrictions on federal lands to protect wolves (M. Jimenez, pers. comm.). The only exception would  
3 have been potential take involving a den site. For example, if an agency planned a controlled burn  
4 in April, the U.S. Fish and Wildlife Service would have asked the agency to wait until the wolves  
5 were out of the affected den later that summer. No other restrictions on federal lands have been  
6 added by other agencies.

## 7 8 **B. State Land** 9

10 As with federal lands, responsibility for managing state lands resides with the state administering  
11 agencies. WDFW has no legal authority to implement land use restrictions on land it does not  
12 manage and land management agencies can and may adopt seasonal or localized area restrictions  
13 independently from WDFW. The only lands that WDFW has management authority over are 32  
14 designated wildlife areas totaling nearly a million acres that are located across the state. WDFW is  
15 developing a Habitat Conservation Plan for its lands that ensure that activities on these lands are in  
16 compliance with the federal Endangered Species Act. For the wolf, conservation measures will  
17 focus primarily on minimizing disturbance to established and active den and rendezvous sites and  
18 minimizing conflicts between wolves and domestic livestock (J. Sutter, pers. comm.).

19  
20 The Washington Department of Natural Resources administers the Washington State Forest  
21 Practices Act Critical Habitats Rule for threatened and endangered species (WAC 222-16-080),  
22 which contains a provision for wolves. The rule applies to timber harvest permit applications on  
23 state and private lands. Forest practices where harvesting, road construction, or site preparation is  
24 proposed within 1 mile of a known active wolf den, as documented by WDFW, between the dates  
25 of March 15 and July 30, or 0.25 mile from the den at other times of the year, are designated as a  
26 Class IV-Special and require an extra 14 days of review, and are subject to State Environmental  
27 Policy Act (SEPA) review. The lack of confirmed wolf dens in Washington has meant that no forest  
28 practice applications for state lands have been affected to date by the wolf critical habitat rule. The  
29 rule was established in 1992, but much has been learned since then about habitat issues involving  
30 wolves in neighboring states, in particular that large disturbance buffers are not necessary for  
31 conservation of the species. This newer information suggests that the rule should be reviewed and  
32 modified to reflect prevention of disturbance of occupied dens only during the denning period.

## 33 34 **C. Private Land** 35

36 As noted above, private lands in Idaho, Montana, and Wyoming have never had wolf-related  
37 restrictions placed on them by federal or state agencies. Therefore, minimal impacts to private land  
38 uses in Washington are expected due to the presence of wolves. Although WDFW has no legal  
39 authority to implement land use restrictions on private lands (with the exception of hydraulic  
40 permits), it may nevertheless ask a private landowner to temporarily delay an activity near a den  
41 during the denning period, especially while wolves remain state listed.

42  
43 The Washington State Forest Practices Act Critical Habitats Rule for threatened and endangered  
44 species (WAC 222-16-080), discussed above in Section B, also applies to timber harvest permit  
45 applications on private lands. No forest practice applications for private lands have been affected to  
46 date by the wolf critical habitat rule.

- 1 Other jurisdictions, such as counties, have regulations that apply to private land. Counties may
- 2 access WDFW information on species and habitats of concern through WDFW's Priority Habitats
- 3 and Species program. Counties may use that information in developing critical areas ordinances.
- 4 Currently, there are no known county critical areas ordinances for wolves in Washington.

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## 9. INFORMATION AND EDUCATION

A well-informed public is essential to gray wolf conservation and some authorities consider outreach efforts to be the highest priority in restoring the species (Fritts et al. 1995, 2003). It is crucial that wolves and wolf management issues be portrayed in an objective and unbiased manner, and that the public receives accurate information on the species. Conflicts with wolves and the solutions and compromises needed to resolve those conflicts must be discussed fairly (Fritts et al. 2003).

Extensive public outreach was conducted before and during wolf recovery in Montana, Idaho, and Wyoming, with a broad mix of approaches used (Fritts et al. 1995). These efforts conveyed a factual and balanced view of wolves, stressed the differences between wolves and other canids, described the legal and biological rationale for recovery, pointed out that some wolf control must accompany recovery, and emphasized that very few restrictions on use of public or private lands are necessary for wolf recovery. The success of wolf recovery in these states is at least in part due to these information and education efforts.

Washington's citizens need access to factual information about wolves and wolf management from wildlife managers; and wildlife managers need information from the public on sightings, depredation events, and wolf behavior to effectively manage wolves in the state. With this two-way communication, implementation of the Wolf Conservation and Management Plan will have a higher probability of success and both managers and the public will have the necessary information to make conservation and management decisions to achieve plan objectives. Two-way communication depends on a public that is informed about wolves and ongoing management activities and agency staff who are well informed and willing to listen to the real and perceived concerns of residents about wolves.

An outreach campaign that is active, rather than passive, in reaching specific groups will best benefit wolf conservation. Information and education strategies must be adaptive, reflecting the adaptive wolf conservation and management strategies described in the overall plan. Communication tools and education methods should be flexible and based on ongoing conservation and management activities, feedback from public attitude surveys, and available funding. Public attitude studies can be used to understand knowledge levels and information needs and to guide the design and targeting of outreach efforts (Schanning 2009, Troxell et al. 2009). Public attitude surveys were an important element in developing WDFW's recent outreach and education plan for cougars (WDFW 2010c) and would be expected to be used to help design outreach and education regarding wolves.

Many WDFW staff are likely be involved at some point in disseminating information about wolves or responding to inquiries from the public. It will be important to ensure that staff receive up-to-date information and training about wolves before engaging in education and outreach efforts. Most dissemination of official information is coordinated by the Public Affairs staff, who work with the news media and update website information. Outreach and education efforts with schools, community groups, and other organizations are conducted by all staff as available. Strategies and tasks for informing and educating people about wolf behavior, conservation, and management in Washington are presented in Chapter 12, Task 9.

## 10. RESEARCH

Development and implementation of research programs are essential parts of any successful wildlife conservation and management plan. Such programs should provide information that can promote adaptive management and process improvement over time. Future conservation and management actions involving Washington's gray wolves will depend on accurate and complete data related to a broad range of biological and social topics, including population status and impacts on affected resources and human activities.

Extensive research on wolves and their impacts has been conducted in recent decades in Idaho, Montana, and Wyoming, and has provided excellent information for directing wolf recovery and management in those states. This body of work will be useful in guiding future wolf investigations in Washington. In some instances, the results of this research will be directly applicable to Washington, but in many cases similar studies will be needed in-state because of differences among states in habitat quality, prey availability, human densities, and other characteristics.

Research will be needed to clarify the understanding of wolves in Washington, their impacts on other species, and to guide the development of longer-term area-specific conservation and management objectives for wolves. Research will likely be conducted by WDFW, other federal and state agencies, tribes, universities, and other scientists, and will rely on cooperative relationships among these entities.

Important research needs relating to wolf conservation and management in Washington are identified in Chapter 12, Task 11. Availability of funding and personnel will determine the rate at which research is conducted. Long-term commitments of funding and support will be needed to do this work. Efforts will be made to obtain funding from multiple sources to conduct the needed research.

## 11. REPORTING AND EVALUATION

The purpose of reporting and evaluation is to determine the success of the plan in meeting the established goals and objectives. Measurements of positive and negative outcomes for wolves and other groups must be identified, compiled, and compared to a standard. Tracking the status and trend of various measurements against a standard will indicate whether implementation of the plan is meeting its goals. An adaptive management approach will be used so that new information can be incorporated into management strategies, which can then be changed if warranted. Strategies for monitoring, evaluating, and reporting the effectiveness of the wolf plan's implementation are presented in Chapter 12, Task 12. These strategies will begin after this plan goes into effect.

Benchmarks for measuring progress toward achieving wolf conservation and management in Washington will be whether objectives are being met for recovery (population numbers and distribution), for managing wolf-livestock conflicts and wolf-ungulate conflicts, for public outreach and education, and for law enforcement. While benchmarks measure results, not effort, monitoring those results can help determine whether to modify program objectives or management practices. The Washington Wolf Interagency Committee and a citizen advisory group could assist WDFW in evaluating the effectiveness of wolf conservation and management in Washington. An evaluation could include measuring how well each portion of the plan is being implemented.

WDFW will also work with U.S. Fish and Wildlife Service on status reviews, designation of distinct population segments, and other activities related to areas where wolves remain federally listed in Washington.

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## 12. GOALS, OBJECTIVES, STRATEGIES, AND TASKS

The purpose of the Washington Wolf Conservation and Management Plan is to ensure a self-sustaining population of gray wolves in the state and to encourage social tolerance for the species by reducing and addressing conflicts. The following goals, objectives, strategies, and tasks are intended to meet this purpose.

### A. Goals

The goals of the Washington Wolf Conservation and Management Plan are to:

- Restore the wolf population in Washington to a self-sustaining size and geographic distribution that will result in wolves having a high probability of persisting in the state through the foreseeable future (>50-100 years).
- Manage wolf-livestock conflicts in a way that minimizes livestock losses, while at the same time not negatively impacting the recovery or long-term perpetuation of a sustainable wolf population.
- Maintain healthy and robust ungulate populations in the state that provide abundant prey for wolves and other predators as well as ample harvest opportunities for hunters.
- Develop public understanding of the conservation and management needs of wolves in Washington, thereby promoting the public's coexistence with the species.

### B. Objectives, Strategies, and Tasks

This section identifies objectives, strategies, and tasks associated with the recovery and management of wolves so that the species can be removed from state listed status in Washington.

#### 1. Develop and implement a program to monitor the population status, trends, and conservation and management needs of wolves in Washington.

A comprehensive population monitoring program is an essential part of the wolf conservation and management program and will be conducted throughout the implementation of this plan. Monitoring will begin as wolves become reestablished and be most intense while the species remains classified as state endangered, threatened, and sensitive. Upon delisting, monitoring should transition from counting numbers of successful breeding pairs to numbers of packs or total wolves.

WDFW will have primary responsibility for monitoring wolves, but collaboration with tribes, other state, federal, and provincial agencies, jurisdictions, universities, landowners, local governments, and the public will be necessary for a successful monitoring program. This coordination will be especially important when monitoring animals located on or near federal, tribal, and private lands, and along state borders. In areas where wolves are federally delisted, the U.S. Fish and Wildlife Service will continue its monitoring and reporting for five years, as required by the Endangered Species Act. WDFW will work with the U.S. Fish and Wildlife Service to coordinate monitoring activities during this period.

1.1. Establish and maintain a wolf specialist position within WDFW, and re-direct activities in field staff work plans to locate wolf packs, monitor wolf movements, and conduct other wolf-related activities as time allows.

1.2. Monitor the locations of wolves in Washington and determine when resident packs and territories become reestablished.

1.2.1. Use howling and “howlbox” surveys, winter tracking, remote camera surveys, trapping, genetic testing, and other methods to determine locations of recolonizing wolves.

Refinements in survey methodology developed and tested in other states will be employed in Washington when appropriate. Some newer techniques (e.g., genetic testing of scat and hair, greater deployment of remote cameras, and use of “howlboxes” and hunter surveys) may be suitable for incorporation into monitoring programs (Ausband et al. 2009b, 2010, USFWS et al. 2011).

1.2.2. Solicit, collect, and evaluate sighting reports by the public and cooperators and conduct follow-up investigations, where warranted, to locate colonizing wolves and packs.

The public will be encouraged to submit reports of wolf activity and sightings (Appendix K). Outreach will be conducted to encourage the public to provide credible wolf sighting reports. Information on wolf identification and where to report sightings will be included in WDFW publications and on the agency’s webpage. All recent and current sighting reports will be mapped and reviewed to evaluate their accuracy and to look for clusters of reports.

1.2.3. Maintain a listing of wolf reports submitted to WDFW by the public on the WDFW website.

Under RCW 77.12.885, WDFW is required to post on its website all reported cougar, wolf, and grizzly bear interactions, including human safety confrontations, sightings, and depredations by these species on humans, pets, or livestock, within 10 days of receiving the report. The posted material must include the species, location and time, known details, and a summary of the report. This information is taken from citizen reports made to the WDFW Enforcement Program.

1.3. Determine the status, trends, distribution, and other population parameters of wolves while listed.

1.3.1. Monitor members of each pack as packs become reestablished.

Trapping and radio telemetry will be important tools for monitoring wolves while listed. The goal will be to radio collar the breeding male and female, and as

many remaining members of each pack as feasible. An attempt will be made to track at least one adult member of each pack via radio collars using satellite technology when possible to locate and record an individual's movements. Captured animals will be genotyped using collected DNA to allow identification and may be marked with a PTT tag.

- 1.3.2. Determine the locations and numbers of successful breeding pairs, packs, and individual wolves each year.

Numbers of successful breeding pairs (with at least two pups surviving until December 31), packs, and total wolves will be determined annually using the results of radio-tracking and other survey techniques. Packs with territories straddling recovery region (or state) boundaries will be counted only in the area where the den site is located. If the den location is not known with certainty, then other criteria such as amount of time, percent of territory, or number of wolf reports will be used to determine pack residency. Thus, a pack will not be counted in more than one recovery region.

- 1.3.3. Determine home ranges, mortality, reproductive success, habitat selection, dispersal, and animal health.

Information from radio tracking and other survey methods will be used to determine ecological and biological characteristics of each pack, such as habitat use, prey selection, locations of den sites and rendezvous sites, number of pups, survival, and mortality.

- 1.3.4. Assess the genetic characteristics and monitor health through the collection and analyses of biological samples from live-captured and dead wolves.

Investigate the potential to have the WDFW genetics lab work with established canid genetic labs to develop the in-house ability to analyze tissue, blood, hair, and scat samples for wolf DNA testing.

- 1.3.5. Publish an annual report with monitoring results, including status, trends, distribution, and other population parameters for wolves each year, and assess progress toward meeting recovery objectives.

- 1.4. Determine the status, trends, distribution, and other population parameters of wolves after delisting.

Following delisting, wolf populations will be monitored to determine annual population status and trends. Because of the difficulty in validating successful breeding pair status as numbers of packs increase, monitoring efforts will change from determining numbers of successful breeding pairs to numbers of packs or total number of wolves. These efforts may provide an indirect estimator of breeding pairs (Mitchell et al. 2010) or alternative measures to assist with determining population size. Expanded use of genetic testing of scat and hair, remote cameras, "howlboxes", hunter surveys, predictive habitat

modeling, and other methodologies may prove to be more cost-effective and less intrusive than trapping and radio-collaring (Ausband et al. 2009b, 2010, Stenglein et al. 2010, USFWS et al. 2011). Collaring may be used in select situations, such as with wolves that appear in new locations.

1.5. If needed, move individual wolves within Washington for genetic purposes.

If genetic research (Task 11.2) determines that an isolated wolf population has reduced genetic diversity, an individual wolf from another population/pack may be moved into the population to increase genetic diversity in an effort to increase population viability. This activity would be conducted solely to facilitate genetic exchange with other populations in the state. Consideration would be given to determining the appropriate source population for animals moved for improving genetic diversity. Because wolves would already be present in the release area, this would not require a feasibility assessment or reviews under SEPA or NEPA.

**2. Protect wolves from sources of mortality and disturbance at den sites.**

2.1. Identify human-related and natural sources of mortality.

Intensive monitoring and research activities will be the primary means of identifying both human-related and natural mortality factors for wolves.

2.2. Minimize factors contributing to wolf mortality.

2.2.1. Minimize mortality from lethal control.

Although lethal control is a necessary tool for reducing wolf depredation on livestock, excessive levels of lethal removal can preclude the recovery of wolf populations, as noted with the Mexican gray wolf in New Mexico and Arizona (USFWS 2005). WDFW will therefore monitor and, if necessary, adjust the extent of lethal removals (including mortalities from lethal take of wolves “in the act” of attacking livestock) to meet both conservation and management needs. Constraints on lethal control have recently been recommended by Brainerd et al. (2008) to minimize negative impacts on recolonizing wolf populations. They suggested that lethal control be limited to solitary individuals or territorial pairs whenever possible, and that removals from reproductive packs should not occur until pups are more than six months old, the packs contain six or more members (including three or more adults or yearlings), neighboring packs exist nearby, and the population totals 75 or more wolves. Consideration should also be given to minimizing lethal control around or between any core recovery areas that are identified, especially during the denning and pup rearing periods (April to September) (E. Bangs, pers. comm.).

2.2.2. Minimize mortality from illegal killing.

Illegal killing is expected to be a source of mortality as wolves recolonize Washington, based on findings from other western states (USFWS 2009).

2.2.2.1 Implement enforcement efforts to protect wolves from illegal killing.

Ensure that WDFW enforcement officers are aware of locations of wolf pack territories within their districts, including den sites and rendezvous sites. Increase patrols and monitor wolves within these areas. WDFW biologists, wolf specialists, and enforcement officers will maintain communication so that any issues that need to be addressed are handled quickly. Work with partners on federal and state lands to ensure protection for wolves, and coordinate enforcement efforts between the U.S. Fish and Wildlife Service and WDFW.

2.2.2.2 Implement efforts to increase social tolerance for wolves.

Programs that increase social tolerance for wolves will help reduce the illegal killing of wolves. Effective management programs that respond to and limit livestock depredation and provide compensation for losses will be especially important in reducing this type of wolf mortality (see Task 4). Education programs that provide accurate information about wolves to the public are equally necessary to reduce this threat (see Task 9).

2.2.2.3 Investigate and prosecute illegal killings of wolves.

Suspected illegal killings should be aggressively investigated. Where wolves are federally listed in Washington, the U.S. Fish and Wildlife Service Office of Law Enforcement would be lead investigative agency. Where they are federally delisted, WDFW would be the lead.

2.2.2.4 Increase penalties for illegally killing wolves when classified as protected wildlife under state law.

Under current state law, wildlife listed as threatened or sensitive are among the species designated as protected fish or wildlife. The penalty for illegally killing these species is relatively minor, being a misdemeanor punishable by a maximum of up to 90 days jail time and/or a fine of up to \$1,000. WDFW will seek increased penalties for illegally killing wolves. This would require a change in RCW 77.15.130.

2.2.2.5 Work with partners to establish rewards for information on suspected killing of wolves.

Conservation Northwest offers a \$7,500 reward for information leading to a conviction of wolf poaching in Washington. Efforts of this type could be expanded in the future.

2.2.3. Minimize mortality from accidental killing.

Strategies will be implemented to minimize mortality of wolves from incidental shooting and trapping. Information and education efforts are needed to inform hunters and trappers about the presence of wolves in occupied areas of the state. Use hunting, fishing, and trapping regulation pamphlets and other means to provide educational messages and identification materials about wolves, including how to avoid accidental shooting during legal hunting seasons. These programs will assist hunters in becoming proficient at distinguishing wolves from coyotes, and trappers in learning methods for avoiding accidental capture of wolves and what to do if a wolf is inadvertently caught. Incidental trapping of wolves is expected to be minimal because, with the exception of tribal trappers, licensed trappers in Washington are only allowed to use box and cage traps.

2.3. Minimize disturbance at active wolf den sites.

2.3.1. Implement protective measures that may be appropriate for protecting active den sites.

Implementation of suitable protective measures around wolf den sites would likely be case-specific. Landowners should be provided information on the locations of den sites, the timing and duration of denning, and how to avoid disturbance of den sites.

2.3.2. Evaluate the state's Forest Practices Act Critical Habitats Rule for the gray wolf and determine if it should be revised.

The critical habitat rule protecting the den sites of wolves from disturbance or possible adverse impacts from forest practice activities was established in 1992 under the Washington State Forest Practices Act Critical Habitats Rule for threatened and endangered species (WAC 222-16-080). Since that time, much information relevant to these concerns has been collected on wolves in Idaho, Montana, and Wyoming. This information should be used to evaluate whether the rule is still appropriate or if changes should be recommended.

**3. Translocate wolves within Washington, if needed, to help achieve recovery objectives.**

The overall timeframe for wolves to disperse naturally into Washington and reestablish a population is difficult to predict, but it could take several decades to reach downlisting and delisting objectives. If wolves have exceeded these objectives in some recovery regions and not

others, then the process may be initiated to evaluate the potential translocation of wolves to areas not achieving recovery objectives. Funding for both a feasibility assessment and an implementation plan should be a high priority.

- 3.1. Determine if wolves are successfully dispersing to each recovery region and establishing successful breeding pairs.

Howling surveys, monitoring of radio-collared individuals, and other methods will be used to determine whether (1) wolves are successfully dispersing to new areas of the state and (2) sufficient numbers of wolves exist in a recovery region to be used as a source for translocation.

- 3.2. Prepare a feasibility assessment for translocating wolves into recovery areas where recovery objectives have not been met.

The feasibility assessment will investigate whether an adequate amount and configuration of suitable habitat and prey are available to support successful breeding pairs of wolves at potential translocation sites. Federal and state lands will be targeted for inclusion in the assessment, especially those that are forested and have low densities of people and livestock. The connectivity of potential translocation sites to areas occupied by wolves will also be considered.

- 3.3. Develop an implementation plan for a translocation.

The implementation plan will be initiated following completion of the feasibility assessment, if it concludes translocation is feasible. If wolves are still federally listed in parts of Washington, WDFW will seek approval from the U.S. Fish and Wildlife Service to conduct the translocation. Coordination with the appropriate land management agencies will also occur.

The implementation plan will investigate and determine the best methods for conducting a translocation (e.g., consideration of appropriate genetic source animals, release methods, disease testing protocols, etc.) and identify and prioritize core release areas. Based on translocations in Idaho and Yellowstone National Park during the 1990s, a genetically diverse founding stock of wolves should be used in the translocation and a location capable of holding several packs and receiving immigrants from other populations should be selected (vonHoldt et al. 2008).

- 3.4. Conduct the environmental review process required to evaluate the proposal to translocate wolves.

If translocation is proposed on federal land, work with the federal land managers to conduct a National Environmental Policy Act (NEPA) review process. If wolves remain federally listed, this will also include a Section 7 consultation with the U.S. Fish and Wildlife Service. A NEPA review would preclude the need for a State Environmental Policy Act (SEPA) review. If the proposal is to translocate wolves onto non-federal land, a SEPA review process would be conducted.

3.5. Coordinate with federal and state agencies, tribal governments, landowners, and non-governmental organizations on translocation activities.

3.6. Translocate wolves within Washington.

Upon completion of SEPA or NEPA review and a decision to implement a translocation, wolves will be captured, radio-collared and permanently marked, and translocated, as specified in an implementation plan.

3.7. Conduct post-release monitoring of wolves to evaluate translocation success.

The implementation plan will describe the monitoring needed to evaluate the translocation's success. Success will be defined in terms of establishing successful breeding pairs of wolves within the targeted recovery region.

#### **4. Develop and implement a comprehensive program to manage wolf-livestock conflicts in cooperation with livestock producers.**

Based on experiences in other states, wolf depredation on livestock is expected to occur in Washington as wolves become reestablished. Resolving wolf-livestock conflicts will require both non-lethal and lethal control responses. Resolution of conflicts will need to be managed in a way that does not jeopardize recovery of the species or require relisting. This approach for managing a listed species is highly unusual, but is required because of the desire to reduce conflicts and build social tolerance for wolves, thereby enhancing the chances for reestablishing the species in the state. It is recognized that there will be some economic costs to livestock producers when conflicts occur. Depredation concerns will be addressed by investigating reported complaints, verifying depredations accurately, implementing depredation management actions to abate or prevent damage, and providing adequate compensation for documented losses in a timely manner.

4.1. Work with livestock producers to resolve conflicts with wolves.

4.1.1. Respond to and resolve reported wolf depredation events in a timely period and work with livestock owners to reduce potential conflicts with wolves.

Depredation management approaches are described in Chapter 4 and summarized in Table 9. Responses to specific depredation events will be based on the local status of wolves to ensure that recovery objectives are met. Management responses will emphasize non-lethal techniques while wolves are recovering and will transition to more flexible approaches as wolves progress toward a delisted status. Livestock producers and the public will be actively informed of and given technical assistance, training, and other resources as available to implement proactive non-lethal wolf management techniques. State personnel and cooperators will receive regular training for investigating complaints and resolving conflicts.

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- 1           4.1.2. Provide information and assist livestock owners with obtaining resources  
2           necessary to implement non-injurious wolf control techniques such as fladry,  
3           hazing supplies, radio-activated guard devices, electric fences, guarding/herding  
4           animals, and other measures as they are developed.  
5
- 6           4.1.3. Work with livestock producer organizations, county extension services, the  
7           Washington Department of Agriculture, local governments, conservation  
8           organizations, and other appropriate groups and agencies to develop and  
9           conduct a comprehensive outreach and educational program on methods to  
10          discourage wolf depredation through the use of media materials, workshops,  
11          website resources, site reviews, evaluations, and other tools.  
12
- 13          4.1.4. Work with state and federal land managers who administer grazing permits in  
14          areas of wolf activity to provide permittees with information on resolving wolf-  
15          livestock conflicts.  
16
- 17          4.1.5. Provide livestock owners with information on how to report suspected livestock  
18          depredation and protect the site so that the cause of death can be determined.  
19
- 20          4.1.6. Inform public and private land managers of wolf activities on their respective  
21          lands.  
22
- 23   4.2.   Verify reported wolf depredations.  
24
- 25          Verification of reported wolf depredations is a critical step in the process of managing  
26          depredation problems. Documenting losses is necessary for both the livestock owner  
27          and WDFW to understand the severity of the problem, to plan appropriate action, to pay  
28          compensation, and to foster good relations between agencies and livestock owners.  
29          Rapid notification of agencies by the livestock owner about suspected depredations is  
30          crucial for verification, and a timely response to suspected livestock depredation reports  
31          by state or federal staff is critical for accurately determining the cause of death.  
32
- 33          4.2.1. Establish a contract with USDA Wildlife Services to assist WDFW staff in  
34          responding to wolf depredation calls in areas where wolves are not federally  
35          listed.  
36
- 37                  Prompt response by personnel trained in depredation investigation techniques is  
38                  important for determining the validity of reported complaints. Personnel from  
39                  WDFW or USDA Wildlife Services will conduct wolf depredation investigations.  
40
- 41          4.2.2. Provide the public with contact numbers so that complaints of suspected wolf  
42          depredation can be promptly reported.  
43
- 44                  If livestock are suspected to have been killed or injured by a wolf, complaints  
45                  should be reported to WDFW or USDA Wildlife Services as soon as possible,  
46                  preferably within 24 hours of finding the animal. See Appendix K and the

WDFW wolf website for current contact telephone numbers, reporting guidelines, and associated information.

4.2.2.1 Make contact telephone numbers for reporting potential wolf depredation available through pamphlets, websites, and other media outlets.

4.2.2.2 Develop brochures for livestock operators that provide contact telephone numbers for reporting potential wolf depredation.

4.2.3. Respond to complaints of suspected wolf depredation in a timely manner.

Upon receiving a complaint involving suspected wolf depredation, WDFW or USDA Wildlife Services will contact the complainant by phone within 24 hours. If agency staff determine that a field investigation is warranted, an on-site inspection will be made within 24 hours of the telephone consultation. In the interim, the livestock operator should be given instructions on how to protect the site. In addition to an on-site inspection, an investigation into a reported wolf complaint may include examination of wolf pack location data and interviews with the complainant, adjacent landowners, veterinarians, and other depredation experts.

4.2.4. Complete the investigation about the suspected wolf depredation and provide the final results.

Upon completion of the investigation, the complaint will be classified as one of the following: confirmed wolf depredation, probable wolf depredation, confirmed non-wolf depredation, unconfirmed depredation, non-depredation, or unconfirmed cause of death (see definitions in Chapter 4, Section G). Results of the investigation will be provided to the complainant. Confirmed and probable wolf depredations will be eligible for compensation under this plan. Where appropriate, land management agencies will also be notified of the results of depredation investigations. If a reported complaint is determined by trained personnel authorized by WDFW to be a confirmed non-wolf depredation or unconfirmed depredation, the incident will be recorded. If wild animals other than wolves are determined to be the cause of the depredation, WDFW or other authorized personnel will provide the appropriate assistance. Appropriate assistance depends on the species involved and may include providing technical or operational assistance.

4.3. Provide compensation for livestock losses due to wolves and implementation of proactive deterrents to reduce such depredations.

4.3.1. Develop a compensation program that pays livestock operators for confirmed and probable wolf livestock losses.

WDFW will develop a process to implement the two-tiered compensation rates identified in Chapter 4 for confirmed and probable depredation by wolves.

4.3.2. Process and reimburse valid compensation claims for confirmed and probable wolf depredations within a timely period.

4.3.2.1. Develop an application and reimbursement process, including forms and instructions to applicants.

4.3.2.2. Provide technical assistance to help applicants apply for reimbursement.

4.3.2.3. Respond to applications within a reasonable time frame, e.g., 14 days, by either affirming the claim and initiating payment or seeking additional justification for the claim.

4.3.3. As part of the compensation program, develop a payment plan to compensate livestock operators for unknown livestock losses.

WDFW will work with a multi-interest stakeholder group to attempt to develop compensation for unknown losses based on the criteria provided in Chapter 4, Section G. If such a payment plan is developed, it should include standards for devising appropriate procedures for documenting historical and current-year livestock losses, determining the validity of claims, and paying valid claims.

4.3.4. Secure a funding source to provide compensation for confirmed, probable, and unknown livestock losses from wolves and to provide funding for implementing proactive non-lethal deterrents to reduce livestock losses from wolves.

WDFW will work with livestock producers, conservation groups, and other members of the public to explore funding sources for both the compensation program and a program to assist with implementing proactive non-lethal measures to reduce conflicts. This will include seeking funding from the state legislature (such as authorized under WAC 232-36), federal grants, foundations, non-governmental organizations, and other sources.

The use of proactive non-lethal tools by livestock producers will be encouraged as a way of reducing depredations by wolves. Defenders of Wildlife has stated its intention to make its Proactive Carnivore Conservation Fund available to producers in Washington for this purpose; and Conservation Northwest, a non-governmental organization in Washington, has expressed willingness to assist with proactive measures.

4.3.5. Ensure a high degree of accountability within the compensation program.

The compensation program will need to include a mechanism to ensure a high degree of accountability within the program, especially for payment for unknown losses. This may involve some sort of multi-interest review board to establish strict criteria for determining valid claims.

4.4. Cooperate with other entities to resolve wolf-livestock conflicts.

Cooperative relationships and agreements with other state, federal, and provincial agencies, tribes, landowners, local governments, and non-governmental entities will be developed and implemented to address depredation concerns. Close coordination with USDA Wildlife Services will be necessary to respond to wolf damage problems in a timely manner. Details regarding who will respond and what protocols are followed will be essential to successfully address wolf conflicts. Non-governmental organizations such as the Defenders of Wildlife, Washington Cattlemen's Association, and Washington State Sheep Producers will be engaged to assist on aspects of wolf-livestock conflict management.

**5. Manage ungulate populations and habitats in Washington to provide an adequate prey base for wolves and to maintain harvest opportunities for hunters.**

5.1. Monitor ungulate populations in areas occupied by wolves.

WDFW and its cooperators already conduct surveys of annual production, recruitment, and harvest of ungulate populations in the state. These data are used to monitor population abundance or trends, and to make recommendations for hunting seasons and other management actions. Nevertheless, management of many populations would benefit from increased survey intensity to improve the precision and accuracy of information. Improvements in survey protocols may enhance efforts to assess the impacts of wolves on prey and to determine if changes in ungulate management strategies are needed.

5.2. Enhance ungulate populations wherever possible, subject to habitat limitations and landowner tolerance.

Maintaining robust prey populations will result in three key benefits for wolf conservation in Washington: (1) providing wolves with an adequate prey base, (2) supplying hunters and recreational viewers of wildlife with continued opportunities to hunt and observe game, and (3) reducing the potential for livestock depredation by providing an alternative to domestic animals. Ungulate populations in areas occupied or likely to be occupied by wolves should be managed consistent with game management plans devised for those populations.

5.2.1. Improve habitat for ungulate populations.

Healthy ungulate populations require adequate summer and winter habitat. Deer and elk are generally most abundant in early successional forests, but this habitat has declined in many parts of Washington in recent decades due to reduced timber harvest, fire exclusion, intensification of reforestation methods, development, and other causes.

WDFW will continue to work with other public land agencies, private landowners, non-governmental organizations (e.g., Rocky Mountain Elk

Foundation, Mule Deer Foundation), and tribal governments to cooperatively manage forestlands and winter and summer habitat for the benefit of ungulate populations. This will include the use of appropriate management practices to improve forage quality in various habitats; management of some habitats preferentially for ungulates; reduction of road densities and off-road vehicle use in critical habitat; maintaining open habitats (e.g., meadows), winter habitats, and productive early successional habitat; improving control of noxious weeds; and protection of valuable lands through acquisitions, leases, landowner agreements, and other methods.

5.2.2. Manage recreational hunting to ensure sufficient prey for viable wolf populations while maintaining hunting opportunities for hunters.

Recreational hunting comprises the largest mortality source for elk and deer populations in Washington (Smith et al. 1994, Myers et al. 1999a, McCorquodale et al. 2003, 2010). Hunter take of antlerless animals is one of the primary tools used to manage ungulate population levels in the state. Recreational harvest levels are adjusted annually to maintain ungulate populations at desired management objectives. Harvest levels are reduced if localized ungulate populations decline due to any of a variety of factors such as severe weather, disease, overharvest, predation, or habitat loss. In order to provide adequate prey for wolves, greater restrictions on antlerless hunting, increased road closures (e.g., McCorquodale et al. 2003) or increased ungulate population objectives may be necessary.

5.2.3. Reduce illegal killing of ungulate populations in wolf-occupied areas.

Illegal killing can be an important source of mortality among elk and deer populations in Washington (Table 12). Elk herds where illegal killing has been identified as a concern includes the South Rainier elk herd and the Olympic elk herd.

Smith et al. (1994) recommended increased patrolling during October, November, and December, when most elk poaching occurs. They also recommended concentrating patrols within 30 miles of human population centers and in locations with high hunter and road densities because most poaching occurs in these areas.

5.3. Manage wolf-ungulate conflicts

5.3.1. Manage conflicts at winter-feeding stations and sites with game fencing.

Wolves could eventually be attracted to WDFW-operated winter-feeding stations for elk and bighorn sheep and to other locations where fences have been built to keep ungulates off croplands and highways. If wolf disturbance at these sites proves serious, it could cause some elk to disperse into agricultural lands and highway rights-of-way. These situations will be evaluated on a case-specific basis

to determine if management responses are needed and, if so, what the responses should be. In some cases, it may be desirable to develop a response plan in advance to address an anticipated conflict.

#### 5.3.2. Manage conflicts with ungulate populations.

Wolf predation is not expected to harm ungulate populations across broad geographic areas of the state. While it is possible for wolf predation to have an effect on ungulate abundance in localized areas, this most often occurs where ungulate populations are already compromised by other factors such as declining habitat quality, severe weather conditions, and predation by other carnivores. Nevertheless, in situations where WDFW determines that wolf predation is a limiting factor for an at-risk ungulate population, and the wolf population in that wolf recovery region is healthy (i.e., it exceeds the delisting objectives for that recovery region), WDFW could consider using site-specific strategies to reduce wolf abundance in the localized area occupied by the ungulate population. These strategies could include moving wolves, lethal control, or other non-lethal control techniques.

#### 5.4. Integrate management of multiple species.

Management of ungulate and carnivore populations should be integrated on an ecological basis. The statewide Game Management Plan includes chapters for each of Washington's major ungulate and carnivore species (WDFW 2008) and management plans exist for eight of the state's 10 elk herds and white-tailed deer (WDFW 2001b, 2002a, b, c, d, 2005, 2006a, b, 2010a). Achieving management goals for all of these species will be enhanced if the plans are considered collectively. The ecological roles of predators and prey should be integrated in these management plans. Coordination among public agencies, landowners, tribes, and non-governmental organizations is also necessary to meet management goals.

### **6. Manage wolf-human interactions to reduce human safety concerns, prevent habituation of wild wolves, decrease the risk of conflicts between domestic dogs and wolves, and to build awareness of the risks posed by wolf hybrids and pet wolves.**

#### 6.1. Respond to human safety concerns.

Attacks on humans by healthy wild wolves are extremely rare events. However, when necessary, WDFW or a cooperating agency will take action if the continued presence of a wolf or wolves poses concerns for human safety, consistent with existing policy for black bears and cougars.

##### 6.1.1. Provide information to the public on the low risk of attacks on humans by wolves, how to prevent and react to wolf attacks, and other concerns.

In particular, provide information to people who might encounter wolves, including hunters, trappers, rural landowners, outdoor recreationists, outfitters

and guides, forest workers and contractors, other natural resource workers, and utility workers,.

6.1.2. Respond to reported wolf-human interactions of concern in a timely manner.

Reports of wolf-human interactions of concern will receive a high priority and be investigated by trained personnel authorized by WDFW. Reported wolf-human safety concerns will be verified and evaluated on a case-by-case basis before management actions are initiated, unless circumstances necessitate immediate action.

6.1.3. Develop WDFW response protocols for reported wolf-human conflicts.

Protocols similar to those used in responding to human safety concerns involving cougars and black bears will be prepared and implemented. Non-lethal methods will be used first unless the situation dictates a more aggressive response, including immediate lethal control (NPS 2003).

6.1.4. Move individual wolves if needed to resolve conflicts.

As described in Chapter 4, Section B, relocation could occur proactively when a wolf or wolves are present in an area that could result in conflict with humans or harm to the wolf. Wolves would be moved to suitable remote habitat on public land, within the same recovery region, at the direction of WDFW and in collaboration with land managers. Relocated individuals would be released in areas unoccupied by other wolves. This could be near, but not within, the territories of existing wolf packs.

6.2. Take actions to reduce the likelihood of wolves becoming habituated to humans.

6.2.1. Inform the public on the risks of habituation and actions that can be taken to prevent it from occurring.

A number of recommendations exist for people to prevent the habituation of wolves, such as not letting wolves become comfortable around humans or human-inhabited areas, not leaving food outdoors, and not feeding wolves (Chapter 7, Section A).

6.2.2. Work with land management agencies on actions that can be taken to reduce the likelihood of wolves becoming habituated to humans.

Examples of such actions would include, where appropriate, the installation of wildlife resistant food and garbage storage structures at recreation sites and the posting of signs and other educational materials at trailheads and campgrounds.

6.2.3. Provide information on avoiding wolf habituation to humans, thereby minimizing the need for lethal management responses.

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6.3. Manage wolf-pet conflicts.

Situations where wolves and pet dogs (including hunting and service dogs) encounter each other can result in dog mortality. As wolves expand their range in Washington, dog owners must be made aware of the potential risks to their animals and become informed on methods for avoiding interactions with wolves. WDFW staff should provide informational materials to dog owners who live or recreate in wolf habitat, which explains how to prevent and react to wolf attacks on dogs (Chapter 7, Section C). Because dogs can transmit diseases to wolf populations, the public should be informed and educated regarding the importance of keeping pets vaccinated against rabies, canine parvovirus, and other canid diseases.

6.4. Address issues regarding wolf hybrids and pet wolves.

6.4.1. Work with local jurisdictions, veterinarians, and non-governmental organizations to discourage the ownership of wolf hybrids by members of the public and to prevent the release of wolf hybrids into the wild. Ownership of pet wolves is no longer allowed in Washington unless the animal was possessed prior to the passage of state law RCW 16.30 in July, 2007. Provide information to the public and local jurisdictions about the new law. Develop and deliver educational messages for wolf hybrid and pet wolf owners about the dangers that hybrids and pet wolves pose to wild wolf recovery and human safety. Information efforts should be aimed at communities where wolf hybrids and pet wolves might be confused with wild wolves.

6.4.2. Explore options for having a voluntary registration of wolf hybrids in Washington, similar to the program of Montana Fish, Wildlife & Parks.

6.4.3. Support efforts to further regulate wolf hybrids in Washington.

**7. Maintain and restore habitat connectivity for wolves in Washington.**

Safe passage within and between habitat areas is vital for allowing wolves to recolonize unoccupied habitat and for promoting genetic and demographic exchange between subpopulations.

7.1. When evaluating lands that might provide connectivity for large-ranging carnivores, consider areas that would benefit wolf dispersal and connectivity between populations.

In Washington, areas of greatest importance for restoring or maintaining connectivity between regions of suitable wolf habitat currently include the upper Columbia-Pend Oreille valleys, Okanogan Valley, Steven Pass-Lake Chelan, Snoqualmie Pass, and the I-5 corridor between the southern Cascades and the Willapa Hills-Olympic Peninsula (Singleton et al. 2002; S. Fitkin, pers. comm.). Other areas may be recognized in the future. Mechanisms to conserve lands and maintain working landscapes include conservation easements, agreements or land acquisitions with willing landowners, and other methods.

7.2. Coordinate with neighboring states and British Columbia to ensure cross-border connectivity between wolf populations.

7.3. Increase opportunities for wolves to move safely across landscapes.

Where appropriate, work with the Washington Department of Transportation to create wildlife crossing structures for assisting wolf movement across highways that act as barriers. Use education and enforcement programs to help reduce illegal and accidental killing of wolves in landscapes used by dispersing wolves.

## **8. Manage conflicts between wolves and state and federal listed/candidate species.**

Conflicts between wolves and other listed/candidate species may occur in the future.

8.1. If conflicts between wolves and other state and federal listed/candidate species occur, make case-specific evaluations to determine if management responses are needed and, if so, what the responses should be. Preference should be given to non-lethal measures, if possible, while wolves remain listed.

Where wolves are federally listed, or if conflicts involve federally listed species, work with the U.S. Fish and Wildlife Service to plan and implement appropriate responses.

8.2. If determined to be needed, develop a response plan in advance to address an anticipated conflict.

For some species (e.g., mountain caribou), it may be desirable to have a response plan already developed, which would provide appropriate potential response options in advance.

## **9. Develop and implement a comprehensive outreach and education program.**

A comprehensive outreach and education program will be needed to provide accurate and updated information on wolf conservation and management and to prepare Washington residents to coexist with wolves. Such a program will have many approaches and messages for meeting the varied information needs of different audiences.

9.1. Strengthen internal knowledge about wolves among agency staff.

It is important that agency (including WDFW) staff interacting with the public about wolves receive accurate background information on an ongoing basis so they can present consistent and factual messages about wolf conservation and management. Targeted staff should include enforcement personnel, biologists, administrators, and front desk staff.

9.2. Provide information to the public about ongoing wolf conservation and management activities.

- 
- 1           9.2.1. Develop a wolf communication and outreach plan for Washington.  
2  
3           9.2.2. Implement wolf outreach and education efforts with programs and materials  
4               appropriate for key audiences.  
5  
6           9.2.3. Provide information on wolf status, biology, habitat use, ecological role, and  
7               place as a part of Washington’s natural heritage.  
8  
9               As information becomes available and is appropriate for release (i.e., information  
10              must be non-sensitive), have maps of current wolf pack territories on the  
11              WDFW website. Include links to the websites of other government agencies and  
12              non-government organizations with additional wolf information. Update the  
13              WDFW website with information on implementation of the wolf plan and  
14              adaptive management, including public feedback tools such as surveys and blogs.  
15  
16          9.2.4. Issue news releases to news media and e-subscribers, as needed, about significant  
17              wolf activity or plan implementation, including field activities, new research,  
18              management responses, and public conduct advisories.  
19  
20          9.2.5. Work with local communities, land management agencies, and others to develop  
21              safe and unobtrusive wildlife viewing opportunities for wolves, as they may  
22              develop in the future.  
23  
24      9.3. Develop and provide training, information, and education programs to address concerns  
25              over wolf-livestock conflicts.  
26  
27          9.3.1. Provide livestock producers with training in methods to prevent, reduce, and  
28              respond to wolf-livestock conflicts or depredations, using USDA Wildlife  
29              Services staff in Washington and the experience of USDA Wildlife Services field  
30              staff in Idaho, Montana, and Wyoming.  
31  
32          9.3.2. Provide livestock producers with information on response options that they can  
33              take to protect their livestock from wolves, as described Chapter 4, Section E,  
34              and summarized in Table 9. Provide updates on these options as wolf listing  
35              designations change.  
36  
37          9.3.3. Inform livestock producers on how to report suspected wolf depredations.  
38  
39          9.3.4. Contact public and private land managers about wolf activities on their lands.  
40              Provide ongoing wolf monitoring information to livestock producers as needed.  
41  
42      9.4. Develop and provide information and education programs for hunters, people viewing  
43              ungulates, and others to address concerns over wolf-ungulate interactions.  
44  
45          9.4.1. Provide information on ungulate population status and trends in Washington.  
46              Provide research results from Washington or elsewhere on wolf diet, wolf-  
47              ungulate relationships, and wolf-ungulate population studies.
-

9.4.2. Communicate information for hunters and wildlife viewers through the WDFW website (e.g., Wolf, “Living with Wildlife,” and wildlife viewing webpages); presentations to the WDFW Game Management and Wildlife Diversity Advisory Councils, hunting groups, and wildlife viewing organizations; and WDFW hunter education course materials.

9.5. Develop and provide training, information, and education programs for the public on how to coexist with wolves.

9.5.1. Produce and distribute informational materials and give presentations and workshops on how to safely live, work, and recreate in areas occupied by wolves. When possible, integrate training and educational opportunities about wolves with information about living with other carnivores in Washington, such as cougars, bears, and coyotes. A similar program that has been conducted in Washington, Oregon, and Idaho is the “Living with Carnivores” program. Such programs can be sponsored cooperatively by multiple agencies and organizations.

9.5.2. Distribute information at backcountry trailheads and other appropriate outlets on wolf identification, behavior, dealing with wolf encounters, methods for avoiding wolf habituation, and the potential for negative interactions with domestic dogs.

9.5.3. Give presentations to provide information to the public about co-existing with wolves in Washington.

Target communities closest to the most wolf activity and conduct open houses, town hall meetings, or other events to inform residents about wolf presence, coexistence, and real or perceived safety issues.

9.5.4. Work with other agencies and organizations to promote wolf outreach.

Work with agencies and a variety of non-governmental and tribal organizations to conduct effective information and education programs about living, recreating, and working with wolves in Washington. These entities could assist in the development and presentation of wolf education materials to the public, be a source of funding, and help increase trust among different stakeholder groups.

A potential model for community outreach is the Grizzly Bear Outreach Project (GBOP), a non-governmental organization whose focus is expanding to include wolves and cougars (<http://www.bearinfo.org>). The project engages community members in a process of education and multi-party dialogue and provides a non-advocacy setting for the involvement of all stakeholder groups. For example, the approach for grizzly bears includes:

- Assessing the knowledge and attitudes of community members prior to implementing education components.

- One-on-one meetings between project staff and community members to gauge concerns and share information.
- Small focus group meetings to discuss grizzly bear issues with 4–6 people at a time in informal settings.
- A coalition of community members to provide a local information source and extend the reach of project staff.
- A project brochure containing information about grizzly bear ecology, and sanitation and safety tips for the home, ranch, and campsite for distribution to communities, hikers, horse packers, hunters, and fishers.
- A modular slide show paralleling the content of the brochure.
- A project website for distribution of information and solicitation of comments from the public.

A similar program for wolves could be developed for selected local communities.

- 9.6. Develop and provide informational material about wolves and co-existing with them for use in school classrooms, environmental learning centers, and other appropriate outlets.

- 9.6.1. Develop and distribute materials for K-12 classrooms.

Develop lesson plan kits that include sets of materials and activities for students to learn about wolves (identification, biology, behavior, habitat use, history in Washington, etc.), using WDFW education webpages and as many already established wolf education resources as available and appropriate.

- 9.6.2. Develop a wolf education webpage.

Work with agency staff to develop a wolf education webpage to assist with lesson planning and presentations, serve as a clearinghouse for approved and appropriate links to more wolf education materials, and provide online learning games and activities.

- 9.7. Determine public attitudes towards wolves and their recovery in the state.

Conduct public attitude surveys in Washington to determine current perceptions about wolves, approval of management practices, and tolerances for conflict in order to inform wolf recovery and management and information and education needs. Develop follow-up surveys to determine the effectiveness of outreach programs relating to wolves and whether changes are needed in these programs.

## **10. Coordinate and cooperate with public agencies, landowners, tribes, and non-governmental organizations to help achieve wolf conservation and management objectives.**

- 10.1. Coordinate and communicate with other entities and jurisdictions to share resources, reduce costs, and avoid potential duplication of effort.

10.1.1. Develop memoranda of understanding or cooperative agreements, if appropriate, to spell out roles and responsibilities and to ensure that certain actions are conducted in a timely manner.

It will be desirable to have key contact people identified in advance to facilitate rapid responses and decision making during conflict situations. Coordination with the following agencies and entities will be important: USDA Wildlife Services; U.S. Fish and Wildlife Service; U.S. Forest Service; National Park Service; Bureau of Land Management; tribal governments; Washington Department of Natural Resources; Washington Department of Agriculture; Washington Department of Transportation; other Washington state agencies; county governments; private landowners; law enforcement entities including the U.S. Fish and Wildlife Service, U.S. Forest Service, and county sheriff departments; natural resource agencies in neighboring states and British Columbia; and non-governmental organizations such as the Defenders of Wildlife, Washington Cattlemen's Association, Washington State Sheep Producers, Washington Farm Bureau, and hunting organizations.

10.1.2. Work with adjacent states and British Columbia to encourage maintenance of populations and habitat connectivity to support long-term viability of wolf populations in Washington.

10.2. Cooperate with other entities to secure funding for wolf conservation and management.

Recovery of wolves in Washington through the conservation and management activities described in this plan will be expensive and require long-term funding from new sources. WDFW will seek funding from a variety of sources, including special state or federal appropriations, private foundations, and other private sources. Coordination with other agencies and non-governmental organizations will ensure the optimal use of resources devoted to wolf conservation and management.

## **11. Conduct research on wolf biology, conservation, and management in Washington.**

Seek funding and initiate partnerships with universities and other entities to carry out research on wolf biology, conservation, and management in Washington. WDFW will initiate wolf research if important management questions arise that could be answered through research and monitoring. Universities and other entities may also be interested in partnering and/or initiating research on the following topics and/or on more purely science-based questions. Research having significant WDFW funding or involvement will be reviewed under WDFW's Scientific Review Protocol.

11.1. Determine wolf population status, pack sizes and distribution, mortality rates and causes, productivity, rates of recolonization, dispersal behavior, and disease/health status in Washington.

Long-term research should be conducted on pack reestablishment, home ranges and movements of packs and lone animals, diet, habitat use, population dynamics, sources of

mortality, diseases, threats to wolves and other factors limiting the reestablishment of populations, and related topics. Data from these studies and monitoring efforts should then be used to model the estimated size, viability, and habitat use of the state's wolf population, as well as to identify information gaps for additional surveys and research.

- 11.2. Determine the genetic relationships of recolonizing and established wolves to assess rates of gene flow, genetic diversity, risk of inbreeding, and sources of recolonizing individuals.

- 11.3. Determine the impacts of wolves on prey and other carnivore populations as wolves become reestablished.

Predator-prey relationships are inherently complex, especially in systems with multiple prey and predator species, as will be the case with wolves and their ungulate prey in Washington. These studies will require baseline data on prey and carnivore populations prior to wolf recovery to help assess the impacts of wolves during and after their reestablishment. Such studies should also examine landscape-level effects.

- 11.3.1. Determine the prey selection of wolves in Washington.

The year-round food habits of wolves should be identified in multiple regions of the state. Elk and/or deer are expected to comprise the vast majority of prey in most locations, but the contribution of other species (e.g., moose, bighorn sheep, mountain goats) is also of interest. Prey selection will likely vary with season, location, and species availability. Age and sex of prey should also be investigated and compared with availability.

- 11.3.2. Investigate the dynamics of ungulate populations in areas occupied by wolves.

If management questions arise about the status of ungulate populations in areas occupied by wolves, the ungulate populations in those areas should be investigated in greater detail to obtain improved information on abundance, demographic parameters, and sources of mortality. This information would provide a strong foundation for determining the extent that wolves or other factors affect prey populations and for making sound management decisions.

- 11.4. If it is determined to be needed, conduct research on wolf depredation of livestock and other domestic animals.

As wolves become reestablished, investigations may be needed on the levels and effects of depredation on livestock and other domestic animals, and the factors influencing depredation. Improved baseline data on depredation levels by other carnivores prior to wolf recolonization will be necessary to assess the impacts of wolves during and after their reestablishment. There is also a strong need to conduct research on non-lethal control methods to reduce wolf depredation on livestock.

- 11.5. Conduct research on the broader ecological impacts that wolves have on plant and wildlife communities.

As noted at Yellowstone National Park, wolves have the potential to affect ecosystems through regulation of ungulate abundance, thereby benefiting a variety of plants, habitats, and animals. These types of ecological interactions should be investigated in the future as wolves become reestablished in Washington.

## 12. Report on and evaluate implementation of the plan.

- 12.1. Centralize data collected during the wolf monitoring program.

WDFW will maintain a centralized database of wolf monitoring data and results to ensure accurate and consistent information is shared with wolf co-managers and the public. WDFW maintains a centralized database (Wildlife Resource Data System) and will retain copies of data collected during annual monitoring activities.

- 12.2. Publish an annual report summarizing information from wolf conservation and management activities.

Because of the intense interest in wolves and the implementation of this plan, WDFW will produce an annual report summarizing all the activities and results of wolf conservation and management that occurred in Washington during the previous year. The first report will be written one year after adoption of this plan. Reports will be similar to those produced by other western states (e.g., USFWS et al. 2011) and will provide summaries of monitoring results with information on population status, distribution, reproduction, population growth, and mortality; documented depredation on domestic animals and management responses; law enforcement; research; outreach; and other activities pertinent to wolves. The annual report will be available to the public on the WDFW agency website and provided to the Washington Fish and Wildlife Commission, elected officials, and any others requesting copies. Upon request, the Commission, Legislature, and others will be briefed and updated regarding the plan's implementation.

- 12.3. Evaluate WDFW's effectiveness in meeting the wolf plan goals, objectives, and strategies.

- 12.3.1. Develop measures to track progress toward meeting the objectives of this plan.

Measures to track progress might include: estimates and trends over time in the numbers and distribution of successful breeding pairs, packs, and total wolves; numbers and success of responses to wolf-livestock conflicts, numbers of wolf-human interactions, and extent of impacts on ungulate populations.

- 12.3.2. Review the effectiveness of the plan's implementation every five years.

WDFW will evaluate the status of Washington's wolves and the effectiveness of implementing the conservation and management plan every five years, with the first review expected in 2016. Measures identified under Task 12.3.1 will be used to assess progress in implementing the plan's objectives and areas where improvements and adaptive management are needed. The Washington Wolf Interagency Committee and a citizen advisory group will be asked to provide feedback on the evaluation.

- 12.4. Use the Washington Wolf Interagency Committee to help coordinate implementation and monitoring of the wolf plan.

There is currently a Washington Wolf Interagency Committee, consisting of members from WDFW, USDA Wildlife Services, U.S. Fish and Wildlife Service, U.S. Forest Service; National Park Service, tribal governments, Washington Department of Natural Resources, and Washington Department of Transportation. In the future, participation could be expanded to include other state, federal, and local agencies, as well as wildlife management agencies in Idaho, British Columbia, and Oregon. The purpose of the committee is to coordinate wolf management across land ownerships in the state. Meetings are open and available to the public. The group should prepare an annual report of its activities and contribute to five-year evaluations assessing the effectiveness of the wolf plan's implementation.

- 12.5. Form a citizen advisory group to provide public feedback on implementation of wolf conservation and management in Washington.

A citizen advisory group will be formed to provide feedback to WDFW on implementation of the conservation and management plan. Aspects addressed might include wolf conservation activities, depredation control activities, the impacts of outreach and education, reviewing problems, and determining needs for new adaptive management procedures. Membership of the advisory group should include a balanced representation of the range of stakeholder values regarding wolf reestablishment in Washington.

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### 13. COSTS AND FUNDING PRIORITIES FOR IMPLEMENTATION

Adequate funding for implementing conservation and management activities is key to the long-term success of the overall plan. This chapter includes estimates of preliminary annual costs to implement some of the most important tasks in the Wolf Conservation and Management Plan during the first six years of implementation (fiscal years 2012-2017). Overall program costs are expected to be smaller during the initial years of wolf recovery when there are fewer wolves to monitor and few claims for compensation of livestock losses, but are expected to increase over time as the wolf population increases.

Priority investments needed to implement the Wolf Conservation and Management Plan during the first six years are listed in Table 14 according to objectives and tasks identified in Chapter 12. They include high priority activities within categories of population monitoring and protection, addressing conflicts with livestock, and outreach and education. The cost estimates for these actions come from a variety of sources, including discussion with government agencies and organizations about current expenditures and readily available budget information for ongoing programs. Wolves would benefit from several ongoing programs (e.g., habitat management for ungulates) that would be carried out regardless of the status of wolves. Only some estimates of partial costs of these programs that can be directly linked to the conservation and management of wolves are included at this time.

Spending levels associated with the plan will be contingent upon availability of funds and creation of partnerships.

#### Potential Sources of Funding

Some sources of funding for these activities are anticipated to be U.S. Fish and Wildlife Service endangered species recovery grants, U.S. Fish and Wildlife Service state wildlife grants, state nongame and endangered species funding, shared costs with partner agencies and non-governmental organizations, and research grants. Funding for some parts of the program, such as compensation, will likely come from non-profit organizations or appropriations sought from the Washington Legislature. Some non-governmental organizations (e.g. Conservation Northwest) have expressed interest in providing some funding for proactive, non-lethal measures to address livestock conflicts if they occur.

Suggestions for new sources of funding include the creation of a wolf license plate that would fund wolf conservation and management activities. WDFW already receives funds from five other wildlife background specialty plates. Wolf-related activities in Wisconsin are partially funded by a wolf license plate issued on behalf of the Wisconsin Department of Natural Resources. In Montana, the Department of Livestock is developing a plate to help fund the state's wolf compensation program. A wolf specialty plate in Washington could help fund wolf management and recovery activities in Washington. Examples of other possible funding sources could include voluntary public contributions (perhaps made through WDFW's website) and the state hotel/motel lodging tax.

Revenues from hunting licenses and game program funds, which are used for managing game populations, would not be used for the wolf management program. In the future, if wolves become a game species following delisting, game funds would be used for wolf management.

#### Potential Partners and Other Responsible Parties

Potential partners and responsible parties are agencies or organizations with authority, responsibility, or expressed interest to implement a specific conservation or management action. The listing of a party does not require them to implement the action(s) or to secure funding for implementing the action(s), but they are possible cooperators to accomplish the action(s).

#### Prioritized Expenditures for the First Six Years (Fiscal Years 2012-2017)

##### *1. Monitor Wolf Distribution and Abundance – High Priority*

A comprehensive population monitoring program is an essential part of the wolf conservation and management program and will be conducted throughout the implementation of this plan. Monitoring of population status and trends will begin as wolves become reestablished and will be most intense while the species remains classified as state endangered, threatened, and sensitive. WDFW will have primary responsibility for monitoring wolves, but collaboration with partners will be necessary for a successful monitoring program.

Task 1.1 Establish and maintain a wolf specialist position or redirect current staff within WDFW to locate wolf packs, monitor wolf movements, and conduct other wolf-related activities.

Task 1.2 Monitor the locations of wolves in Washington and determine when resident packs and territories become reestablished.

Task 1.3 Determine the status, trends, distribution, and other population parameters of wolves while listed.

Timeline: Immediate and ongoing for the wolf specialist; efforts will be increased as the wolf population expands in Washington

Cost: \$100,000/yr (1 wolf specialist)  
\$60,000-100,000/yr (6 Wildlife Biologist @5%, telemetry equipment, other equipment, flights, etc)

Potential Partners: U.S. Fish and Wildlife Service, Forest Service, National Park Service, non-governmental organizations, Washington Department of Natural Resources, interested tribal governments, universities, Idaho Department of Fish and Game, Oregon Department of Fish and Wildlife, British Columbia Ministry of Environment

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## 2. *Protect Wolf Populations* – High Priority

Strategies will be implemented to protect wolves from sources of mortality and disturbance at den sites. Illegal killing is expected to be a source of mortality as wolves recolonize Washington, based on findings from other western states (USFWS 2009). Intensive monitoring and research activities will be the primary means of identifying both human-related and natural mortality factors for wolves. Wolf managers will ensure that WDFW enforcement officers are aware of locations of wolf pack territories in their districts, including den sites and rendezvous sites, so that increased patrolling and monitoring of wolves occurs in these areas. WDFW biologists, wolf specialists, and enforcement officers will maintain communication so that any issues that need to be addressed are quickly handled. WDFW will work with partners on federal and state lands to ensure protection for wolves, and will coordinate enforcement efforts with the U.S. Fish and Wildlife Service.

Task 2.1 Identify human-related and natural sources of mortality.

Task 2.2 Minimize factors contributing to wolf mortality.

Task 2.3 Minimize disturbance at active wolf den sites.

Timeline: Immediate and ongoing; efforts will be increased as the wolf population expands in Washington

Cost: \$65,000-75,000/yr (10 Enforcement Officers @3%, 6 Wildlife Biologists @3%)

Potential Partners: U.S. Fish and Wildlife Service, Forest Service, National Park Service, Washington Department of Natural Resources, non-governmental organizations, interested tribal governments, state, county, and municipal law enforcement agencies

## 3. *Manage Wolf-Livestock Conflicts* – High priority

Wolf depredation on livestock is expected to occur in Washington as wolves become reestablished. Resolving wolf-livestock conflicts will require both non-lethal and lethal control responses. Resolution of conflicts will need to be managed in a way that does not jeopardize recovery of the species or require relisting. This approach is required because of the desire to reduce conflicts and build social tolerance for wolves, thereby enhancing the chances for reestablishing the species in the state. WDFW will provide technical assistance to livestock producers to assist proactive measures to prevent conflicts.

It is recognized that there will be some economic costs to producers when conflicts occur. Depredation concerns will be addressed by investigating reported complaints, verifying depredations accurately, implementing depredation management actions to abate or prevent damage, and providing adequate compensation for documented losses in a timely manner.

Where wolves are federally listed, the U.S. Fish and Wildlife Service and USDA Wildlife Services will be in the lead to respond to depredation reports. In areas where wolves are federally delisted, WDFW will be in the lead to respond.

Task 4.1 Work with livestock producers to resolve conflicts with wolves.

Task 4.2 Verify reported wolf depredations.

Timeline: Immediate and ongoing; efforts will be increased as the wolf population expands in Washington

Cost: \$30,000/yr (10 Enforcement Officers @2%, 7 Wildlife Biologists @2%)  
\$25,000/yr (materials)

Potential Partners: USDA Wildlife Services, U.S. Fish and Wildlife Service, Forest Service, Washington Department of Natural Resources, non-governmental organizations, interested tribal governments, Washington Department of Agriculture, county extension services, private landowners, Bureau of Land Management

#### 4. *Provide Compensation for Livestock Losses* – High priority

Task 4.3 Provide compensation for livestock losses due to wolves and to implement proactive deterrents to reduce such depredations.

Timeline: Ongoing; efforts will be increased as the wolf population expands in Washington

Cost: Currently \$0; future costs to be determined. Compensation for confirmed and probable wolf depredation could range from \$0-10,000/yr over the next 6 years. For comparison, see Table 20, which presents data from other states on compensation paid during varying levels of wolf population recovery. Washington payments would be somewhat higher because of the double payments on sites of 100 or more acres. Payment of claims would be dependent on availability of funds.

Potential Partners: Non-governmental organizations, state and federal agencies

#### 5. *Assist with Proactive Deterrents to Reduce Livestock Conflicts* – High priority

Task 4.3 Provide compensation for livestock losses due to wolves and to implement proactive deterrents to reduce such depredations.

Timeline: Ongoing; efforts will be increased as the wolf population expands in Washington

Cost: Currently \$3,000; future costs to be determined. Costs of proactive deterrents could range from \$4,000-10,000/yr over the next 6 years, depending on the number of conflicts. These could include radio-collars, turbo-fladry, RAG boxes, Range Riders, etc. It is expected that public and private partners would help fund the use of proactive deterrents.

Potential Partners: Non-governmental organizations, state and federal agencies, private landowners, interested tribal governments

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6. *Conduct Outreach and Education* – High Priority

A comprehensive outreach and education program will be needed to provide accurate and updated information on wolf conservation and management and to prepare Washington residents to coexist with wolves. Such a program will have many approaches and messages for meeting the varied information needs of different audiences. One initial priority is to develop a wolf communication and outreach plan for Washington. Outreach will involve providing the public with numerous types of information relating to wolves and their status in the state. Outreach to livestock producers will provide information and training in methods for preventing and responding to wolf-livestock conflicts and depredations. Outreach to hunters will focus on ungulate population status and trends, wolf diet, wolf-ungulate relationships, and wolf-ungulate population studies. Outreach to the general public will include information on how to safely live, work, and recreate in areas occupied by wolves. Public attitude surveys will be conducted in Washington to determine current perceptions about wolves, approval of management practices, and tolerances for conflict in order to inform wolf recovery and management and information and education needs. To better design a wolf outreach program, surveys of Washington residents are needed to assess the public's needs for wolf information and outreach.

Task 9.2 Provide information to the public about ongoing wolf conservation and management activities.

Task 9.3 Develop and provide training, information, and education programs to address concerns over wolf-livestock conflicts.

Task 9.4 Develop and provide information and education programs for hunters, people viewing ungulates, and others to address concerns over wolf-ungulate interactions.

Task 9.5 Develop and provide training, information, and education programs for the public on how to coexist with wolves.

Task 9.7 Determine public attitudes towards wolves and their recovery in the state.

Timeline: Immediate and ongoing; efforts will be increased as the wolf population expands in Washington

Cost: \$30,000/yr (2 Public Affairs staff @5%, 9 Wildlife Biologists @1%, 10 Enforcement Officers @1%)  
\$25,000/yr (materials)  
\$50,000 (contract to conduct survey to assess public knowledge and attitudes prior to designing outreach plan; this would be a one-time cost in the first year)

Potential Partners: U.S. Fish and Wildlife Service, non-governmental organizations, Forest Service, National Park Service, Washington Department of Natural Resources, interested tribal governments, USDA Wildlife Services, county extension services, county and municipal governments

Table 14. Current (2011) and future (2012-2017) estimated costs for implementing high priority tasks in the Wolf Conservation and Management Plan.

Priority Expenditures	2011 Costs	2012 Estimate	2013 Estimate	2014 Estimate	2015 Estimate	2016 Estimate	2017 Estimate
1. Monitor Wolf Distribution and Abundance	\$140,000	\$160,000	\$160,000	\$180,000	\$180,000	\$200,000	\$200,000
2. Protect Wolf Populations	\$50,000	\$65,000	\$65,000	\$65,000	\$75,000	\$75,000	\$75,000
3. Manage Wolf-Livestock Conflicts	\$5,000	\$55,000	\$55,000	\$55,000	\$55,000	\$55,000	\$55,000
4. Compensation for Livestock Losses	\$0	\$2,500	\$4,000	\$5,000	\$6,000	\$8,000	\$10,000
5. Assist with Proactive Deterrents	\$3,000	\$4,000	\$5,000	\$5,000	\$6,000	\$8,000	\$10,000
6. Conduct Outreach and Education	\$30,000	\$105,000	\$55,000	\$55,000	\$55,000	\$55,000	\$55,000
Total	\$228,000	\$391,500	\$344,000	\$365,000	\$377,000	\$401,000	\$405,000

## 14. ECONOMIC ANALYSIS

The main objectives of this chapter are to describe and assess the potential impacts (both negative and positive) to specific sectors of Washington's economy as wolves become reestablished in the state, with information provided on the following topics:

- background on Washington's human population and economy (Section A)
- potential impacts to livestock production (Section B)
- potential impacts to big game hunting (Section C)
- potential impacts to wildlife tourism (Section D)
- potential impacts to the forest products industry (Section E)
- potential impacts to other segments of the economy (Section F)

Values of wildlife are reflected in social attitudes and actions associated with wildlife use and management. Until recently the negative economic impacts of wolves, such as livestock depredation and wild game losses, dominated social perceptions of the species. Yet, economic activities and their relative importance change as social norms and practices change. This chapter provides recent data on a number of pertinent topics, including (1) economic activity in Washington, (2) statewide livestock production, (3) wolf depredation in neighboring states, (4) big game status and hunting in Washington, (5) WDFW license revenues and hunting tag sales, (6) wildlife watching in the state, (7) wolf viewing in other states, and (8) the forest products industry in Washington. This background information comes from many sources, but primarily from economic evaluations of wolf reintroductions in other states (e.g., MFWP 2003, Kroeger et al. 2006, Unsworth et al. 2005, Duffield et al. 2006, 2008), other literature on wolves from elsewhere in the United States, published and unpublished data from WDFW and other state and federal agencies, and interviews and correspondence with state and federal officials, especially state wolf managers in Idaho and Montana, and others such as the president of the Washington Outfitters and Guides Association. Data limitations have required that some information be presented on a broader statewide or subregional basis rather than on a county level, where wolf-related impacts are most likely to be felt.

Many of the (negative) costs and (positive) benefits that could result from the presence of wolves are included in this chapter. This discussion employs a regional economic accounting approach that focuses on expenditures and market prices to evaluate the economic impacts of wolves returning to Washington. It does not use a full benefit-cost framework wherein the net benefits and costs to society as a whole are examined. Under this latter approach, non-market values would also be considered (Duffield and Neher 1996, MFWP 2003) and would include, for example, the personal benefits that hunters derive from the experience of going hunting. Passive use or non-use values, such as those that some individuals may place on knowing that wolves are being restored in Washington, also fall under this approach.

Additionally, this chapter does not make use of multiplier values because they have not been reliably estimated for many of the economic sectors discussed. Multipliers reflect the total spending impact throughout an economy that can be expected from a specific activity through resulting "ripple effects" or spin-off activities.

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**A. Washington's Population and Economy**

Washington had an estimated human population of 6.49 million people in 2007, which is the second largest of any western state (OFM 2007a, USCB 2007). Seventy-eight percent of the population, or about 5.07 million people, live in western Washington, whereas 22%, or about 1.42 million people, reside in eastern Washington. Total population size has expanded 10.2% since 2000 and is projected to grow another 33% by 2030, reaching 8.64 million people. Current overall human density (97.5 people per square mile) is higher than in any other state in the West aside from California. Average density is substantially higher in western Washington (204.9 people per square mile) than in eastern Washington (34.0 people per square mile). Seventeen of the state's 39 counties have average human densities of fewer than 25 people per square mile (OFM 2008). Average human density for the state is expected to reach 129.8 people per square mile by 2030 (OFM 2006a).

Median household income in Washington was \$53,439 in 2004-2006, which was 10.9% greater than in the nation as a whole (ERFC 2007a). The state's median household income increased at a faster rate than the U.S. median in most years since 1996. In 2006, mean per capita personal income for the state was \$38,067, which ranked 16th in the nation. Per capita income has increased steadily over the past decade at 3.0% annually and is also above the national average. Total personal income in the state was \$243.5 billion in 2006.

Washington ranks fairly high nationally in most categories pertaining to quality of life (ERFC 2007a). It ranks well above the national averages for air and water quality, various health indices, availability and use of state parks and recreation areas, and public library service, and ranks well below the national averages for rates of violent crime, homicide, and amounts of environmental toxins released. However, the state rates relatively poorly for cost of housing in urban areas and funding for the arts. Washington also ranks in the upper half of the country in educational skills and accomplishments of its residents (ERFC 2007a).

**B. Livestock Production**

A concern about the reestablishment of wolves in Washington is their potential to kill, injure, or stress cattle, sheep, and other domestic animals. Financial losses may result directly from wolf depredation whether confirmed or not, and indirect financial losses may accumulate because of increased management activities or changes to ranching and farming operations. These financial losses would accrue to individual producers and may be significant to them (Muhly and Musiani 2009).

Overview of Livestock Production in Washington

The total value of agricultural production for all crops and livestock in Washington was \$6.67 billion in 2006 (NASS 2007a), representing an estimated 2.3% of the state's economic output. Livestock accounted for 23% of the value of all farm products sold (NASS 2007a). Farm income comprised 0.5% of the total personal income in the state (ERFC 2007b).

Production value of cattle and milk totaled \$1.28 billion and accounted for 82% of all livestock-related output in Washington in 2006. Estimated inventories of cattle and calves in the state have remained relatively stable at about 1.1-1.2 million head during the past decade (NASS 2004, 2007a).

These estimates include both beef and dairy cattle, as well as about 300,000 cattle confined to feedlots. Surveys from 2002, the most recent year for which full data are available, reveal that cattle inventories per county are generally largest in counties along the Cascade Mountains and in the Columbia Basin (Table 15). Most of the state's cattle operations are categorized as extra small (1-49 head; 80% of total), whereas 13% of operations hold 100 or more head (Table 16). The three geographic regions where wolves are most likely to first reestablish (i.e., northeastern Washington, southeastern Washington, and the Cascades) held about 669,000 cattle and 6,100 cattle ranching and farming operations in 2002, or 61% and 63% of the state's totals in these categories, respectively (Tables 15, 16). Within these regions, cattle numbers were largest in Yakima, Whatcom, and Okanogan counties and smallest in Skamania and Chelan counties (Table 15). The vast majority of non-confined cattle in the state are produced in eastern Washington.

Washington's sheep industry is far smaller than its cattle industry, with the statewide production value of sheep and wool totaling \$3.9 million in 2006 and accounting for 0.3% of all livestock-related output. Historical sheep production peaked in the early 1900s, when more than 800,000 head were present, but has declined greatly since then. Estimated numbers have fluctuated between 46,000 and 58,000 head during the past decade (NASS 2007a). In 2002, the last year for which full data are available, sheep inventories totaled 58,000 head statewide and were largest in Yakima, Okanogan, Grant, and Whitman counties (Table 15). Most sheep operations in the state are categorized as extra small (1-24 head; 71% of total), whereas 5% of operations held 100 or more head (Table 16). The three geographic regions where wolves are most likely to first reestablish (i.e., northeastern Washington, southeastern Washington, and the Cascades) held about 35,000 sheep and 960 sheep ranching operations in 2002, or 60% and 56% of the state's totals in these categories, respectively. Among the counties in these regions, sheep numbers were largest in Yakima and Okanogan counties and smallest in Skamania, Pend Oreille, Garfield, Columbia, and Asotin counties (Table 16).

Table 15. Inventories of livestock and farmland in Washington's 39 counties in 2002 (NASS 2004).

	Number of animals					Total farmland (acres) <sup>d</sup>	% of county in farmland
	Cattle <sup>a</sup>	Sheep <sup>b</sup>	Horses	Goats <sup>c</sup>	Llamas		
Washington total	1,100,181	58,470	75,951	23,217	12,701	15,318,008	36.0
Average per county	28,210	1,499	1,947	595	326	392,769	33.0
<u>Northeastern Washington</u>							
Ferry	8,891	511	1,259	9	136	799,435	56.7
Okanogan	43,602	3,490	5,084	925	196	1,241,316	36.8
Pend Oreille	5,001	209	640	D <sup>e</sup>	59	61,239	6.8
Stevens	30,009	2,244	3,437	693	265	528,402	33.3
Average	22,626	1,614	2,605	542	164	657,598	33.4
<u>Southeastern Washington</u>							
Asotin	9,939	537	431	181	5	280,393	69.0
Columbia	5,709	384	326	94	D <sup>e</sup>	294,661	53.0
Garfield	10,520	376	273	51	-	312,425	68.7
Average	8,723	432	343	109	3	295,826	63.6

	Number of animals					Total farmland (acres) <sup>d</sup>	% of county in farmland
	Cattle <sup>a</sup>	Sheep <sup>b</sup>	Horses	Goats <sup>c</sup>	Llamas		
<u>Columbia Basin</u>							
Adams	36,462	981	508	115	37	1,067,079	86.6
Benton	28,513	2,116	2,434	1,855	144	607,963	55.8
Douglas	11,389	154	742	311	42	878,867	75.4
Franklin	43,745	1,477	1,221	558	143	664,875	83.6
Grant	156,999	3,369	2,929	956	169	1,074,074	62.6
Lincoln	22,706	940	1,412	814	14	1,233,377	83.4
Spokane	25,821	2,430	5,623	1,033	1,306	643,377	57.0
Walla Walla	24,358	1,131	1,356	910	208	700,560	86.2
Whitman	15,721	3,213	908	527	83	1,328,337	96.1
Average	40,635	1,757	1,904	787	238	910,945	76.3
<u>Cascades</u>							
Chelan	1,404	D <sup>e</sup>	836	104	105	112,023	6.0
Clark	16,068	1,993	3,433	1,362	1,396	70,694	17.6
Cowlitz	4,546	824	1,066	117	178	39,582	5.4
King	22,529	1,780	5,227	423	1,054	41,769	3.1
Kittitas	31,415	2,284	3,749	369	6	230,646	15.7
Klickitat	22,719	2,669	1,525	1,429	315	606,794	50.6
Lewis	31,917	1,658	2,891	660	442	130,950	8.5
Pierce	14,090	2,013	4,621	1,146	683	57,224	5.3
Skagit	36,059	766	1,394	403	294	113,821	10.2
Skamania	626	157	142	64	31	5,712	0.5
Snohomish	32,165	1,676	4,907	1,536	584	68,612	5.1
Whatcom	112,417	691	2,350	1,069	408	148,027	10.9
Yakima	230,275	10,786	5,616	3,130	685	1,678,984	61.1
Average	42,787	2,275	2,904	909	475	254,218	15.4
<u>Other Western Washington Counties</u>							
Clallam	5,744	1,071	929	304	493	22,372	2.0
Grays Harbor	10,543	574	808	141	281	53,594	4.4
Island	5,217	388	707	102	846	15,018	11.3
Jefferson	3,306	442	385	110	142	12,274	1.1
Kitsap	1,300	682	1,837	341	323	16,094	6.4
Mason	1,552	188	502	240	75	21,641	3.5
Pacific	7,108	D <sup>e</sup>	321	D <sup>e</sup>	D <sup>e</sup>	51,824	8.7
San Juan	2,333	2,731	347	148	820	17,145	15.3
Thurston	23,928	860	3,639	868	687	74,442	16.0
Wahkiakum	3,535	558	136	104	D <sup>e</sup>	12,386	7.3
Average	6,457	833	961	262	458	29,679	7.6

<sup>a</sup> Includes beef, dairy, and other cattle. Other cattle are defined as heifers, steers, bulls 500 pounds and over, and all calves under 500 pounds. Total numbers in the state for 2007 were estimated at 1,140,000 head (NASS 2007a).

<sup>b</sup> Includes sheep and lambs. Total numbers in the state for 2007 were estimated at 51,000 head (NASS 2007a).

<sup>c</sup> Includes angora, milk, and meat goats. Total numbers in the state for 2007 were estimated at 33,200 head (NASS 2007a).

<sup>d</sup> Farms are defined as any location from which \$1,000 or more of agricultural products were produced and sold, or normally would have been sold, during the census year.

<sup>e</sup> Figures are withheld in USDA (2004) to avoid disclosing data for individual farming operations.

Table 16. Numbers of cattle and sheep operations by size category and geographic region for Washington's 39 counties in 2002 (NASS 2004).

	Numbers of cattle operations <sup>a,b</sup>					Numbers of sheep operations <sup>b,c</sup>				
	Total operations	Extra small (<50 head)	Small (50-99 head)	Medium (100-499 head)	Large (≥500 head)	Total operations	Extra small (<25 head)	Small (25-99 head)	Medium (100-999 head)	Large (≥1,000 head)
Washington total	12,215	9,711	866	1,273	365	1,709	1,221	405	79	4
Percent of total	100%	80%	7%	10%	3%	100%	71%	24%	5%	<1%
Average no. per county	313	249	22	33	9	44	31	10	2	<1
<u>Northeastern Washington</u>										
Ferry	101	72	8	18	3	17	5	11	1	-
Okanogan	451	324	41	59	6	74	44	27	2	1
Pend Oreille	147	123	12	11	1	15	11	4	-	-
Stevens	569	441	66	60	2	53	38	13	1	1
Average	317	240	32	37	3	40	25	14	1	1
<u>Southeastern Washington</u>										
Asotin	101	55	16	27	3	7	4	2	1	-
Columbia	97	73	10	12	2	13	10	3	-	-
Garfield	71	38	11	16	6	11	6	4	1	-
Average	90	55	12	18	4	10	7	3	1	-
<u>Columbia Basin</u>										
Adams	172	114	15	29	14	20	13	4	3	-
Benton	468	422	23	18	5	68	48	15	5	-
Douglas	95	59	10	23	3	7	5	2	-	-
Franklin	211	137	17	32	25	36	17	16	3	-
Grant	516	353	43	82	38	66	41	15	10	-
Lincoln	211	115	37	53	6	28	17	11	-	-
Spokane	649	546	46	52	5	93	77	12	4	-
Walla Walla	239	192	24	18	5	54	41	12	1	-
Whitman	238	165	37	30	6	67	43	20	3	1
Average	311	234	28	37	12	49	34	12	3	-
<u>Cascades</u>										
Chelan	66	57	5	4	-	11	10	1	-	-
Clark	693	648	24	15	6	83	55	24	4	-

Table 16. Numbers of cattle and sheep operations by size category and geographic region for Washington's 39 counties in 2002 (NASS 2004).

	Numbers of cattle operations <sup>a,b</sup>					Numbers of sheep operations <sup>b,c</sup>				
	Total operations	Extra small (<50 head)	Small (50-99 head)	Medium (100-499 head)	Large (≥500 head)	Total operations	Extra small (<25 head)	Small (25-99 head)	Medium (100-999 head)	Large (≥1,000 head)
Cowlitz	261	247	8	4	2	29	21	6	2	-
King	418	351	19	36	12	89	65	23	1	-
Kittitas	339	242	30	55	12	64	47	15	2	-
Klickitat	267	168	36	58	5	61	43	10	8	-
Lewis	756	645	46	59	6	81	59	19	3	-
Pierce	629	594	17	14	4	90	74	14	2	-
Skagit	402	296	25	63	18	32	25	5	2	-
Skamania	35	30	4	1	-	6	4	2	-	-
Snohomish	561	485	12	45	19	73	51	20	2	-
Whatcom	813	502	66	183	62	58	52	6	-	-
Yakima	916	697	66	88	65	97	78	14	4	1
Average	472	382	28	48	16	60	45	12	2	-
<u>Other Western Washington Counties</u>										
Clallam	186	160	10	15	1	37	27	7	3	-
Grays Harbor	271	233	19	16	3	66	41	15	10	-
Island	166	152	6	4	4	25	20	5	-	-
Jefferson	76	57	10	7	2	11	5	4	2	-
Kitsap	168	166	2	-	-	49	39	10	-	-
Mason	73	65	3	5	-	16	16	-	-	-
Pacific	130	103	13	12	2	2	2	-	-	-
San Juan	81	72	3	6	-	77	41	30	6	-
Thurston	485	439	19	20	7	60	49	11	-	-
Wahkiakum	91	73	7	11	-	12	4	6	2	-
Average	173	152	9	10	2	36	24	9	2	-

<sup>a</sup> Includes beef, dairy, and other cattle. Other cattle are defined as heifers, steers, bulls 500 pounds and over, and all calves under 500 pounds.

<sup>b</sup> An operation is defined as any location from which \$1,000 or more of livestock-related products were produced and sold, or normally would have been sold, during the census year.

<sup>c</sup> Includes sheep and lambs.

Other livestock that are vulnerable to wolf predation include goats, llamas, and horses. Inventories of these animals in Washington in 2002 were as follows: horses, nearly 76,000 head, most numerous in Spokane, Yakima, King, and Okanogan counties; goats, about 23,200 head, most numerous in Yakima, Benton, and Snohomish counties; and llamas, 12,700 head, most numerous in Clark, Spokane, and King counties (Table 15). Goats are the only livestock species to have significantly expanded in abundance over the past decade, with numbers more than doubling from 16,000 head in 1997 to 33,200 goats in 2007 (NASS 2004, 2007a). Horses, goats, llamas, and other livestock are kept mainly by hobby owners rather than for commercial production. Statewide sales figures totaled \$18.6 million for horses (combined with small numbers of ponies, mules, burros, and donkeys) in 2002 (NASS 2004), but data does not exist for goats and llamas. Swine are excluded from this discussion because they have not been depredated by wolves in neighboring states and are therefore not considered at risk.

Many livestock producers in Washington rely entirely on private land for their annual operations, whereas some depend on a combination of private land and public land grazing leases. In these latter cases, animals are typically kept on private land during the winter, with most calving and lambing occurring in late winter or early spring. During the warmer months, livestock are taken to grazing allotments on public lands, many of which occur in more remote locations with rougher topography and natural vegetative cover. Livestock are then gathered in the fall, with young shipped to market and breeding stock returned to private land for winter.

About 3.36 million acres in 1,333 active grazing leases currently exist on public lands in Washington (Table 17). The majority of leased acreage occurs on national forest lands, with smaller amounts on lands owned or managed by the Washington Department of Natural Resources, U.S. Bureau of Land Management, and WDFW. Overall, grazing occurs on about 24.9% of the lands owned or managed by these four agencies combined. By far the most leases occur in eastern Washington and are used by cattle. Average lease size is considerably larger on national forest lands (14,109 acres per lease) than on other agency lands (WDNR, 967 acres per lease or permit range; BLM, 986 acres per lease; WDFW, 1,761 acres per lease). On Forest Service lands, considerable variation exists in the percent of land designated as grazing leases within each national forest, ranging from a high of 52.7% in Colville National Forest to 0% in Mt. Baker-Snoqualmie and Olympic National Forests (Table 17). Numbers of active leases on national forests have declined substantially over the past 15 years primarily because of economic and social reasons (W. Gaines, pers. comm.).

Producers can lose livestock to a variety of natural and non-natural causes, including disease, weather, birthing problems, and predation. In Washington, death losses from all causes totaled 44,000 cattle and calves in 2005 and 5,000 sheep and lambs in 2004 (Table 18). These represented 4.1% of all cattle and calves and 10.9% of all sheep and lambs raised in the state. Ninety-four percent of cattle and calf death losses were non-predator related and were valued at \$28.7 million (Table 18). For sheep and lambs, 54% of death losses were non-predator related and were valued at \$293,000. Predators (primarily coyotes and cougars) killed an estimated 2,500 cattle and calves worth \$1.53 million and 2,300 sheep and lambs worth \$192,000 (Table 18).

#### Wolf Depredation on Ranch Animals

Background information on this topic appears in Chapter 4, Sections A and B.

## Compensation Programs for Wolf-Related Losses and Deterrence

Several compensation programs currently exist or are under consideration in the western United States to help producers recover some of the costs associated with wolf predation. These are described in Chapter 4, Section C.

Table 17. Numbers and acreages of active grazing leases by livestock category on lands owned by the U.S. Forest Service, U.S. Bureau of Land Management, Washington Department of Natural Resources, and WDFW in Washington.

Agency	Cattle		Sheep		Unassigned by species		Total		Percent of Agency Land <sup>a</sup>
	No.	Acreage	No.	Acreage	No.	Acreage	No.	Acreage	
Forest Service <sup>b</sup>									
Okanogan N. F.	69	770,563	0	0	1	11,427	70	781,990	45.7
Colville N. F.	52	714,990	0	0	1	2,333	53	717,323	59.8
Wenatchee N. F.	14	147,937	10	266,108	0	0	24	414,045	18.6
Gifford Pinchot N. F.	3	188,531	0	0	0	0	3	188,531	13.8
Umatilla N. F. <sup>c</sup>	5	85,010	0	0	0	0	5	85,010	27.3
Mt. Baker-Snoqualmie	0	0	0	0	0	0	0	0	0
Olympic N.F.	0	0	0	0	0	0	0	0	0
Subtotal	143	1,907,031	10	266,108	2	13,760	155	2,186,899	23.8
Washington DNR <sup>d</sup>									
Southeast	0	0	0	0	458	449,130	458	449,130	47.0
Northeast	0	0	0	0	404	393,194	404	393,194	69.7
Pacific Cascade	0	0	0	0	5	152	5	152	<0.1
Northwest	0	0	0	0	2	120	2	120	<0.1
South Puget Sound	0	0	0	0	2	30	2	30	<0.1
Olympic	0	0	0	0	0	0	0	0	0
Subtotal	0	0	0	0	871	842,626	871	842,626	27.3
Bureau of Land Mgmt. <sup>e</sup>									
Eastern Washington	271	265,024	2	4,635	1	606	274	270,265	63.7
Western Washington	0	0	0	0	0	0	0	0	0
Subtotal	271	265,024	2	4,635	1	606	274	270,265	63.5
WDFW <sup>f</sup>									
Eastern Washington	30	57,337	0	0	0	0	30	57,337	7.6
Western Washington	3	765	0	0	0	0	3	765	1.4
Subtotal	33	58,102	0	0	0	0	33	58,102	7.2
Total	447	2,230,157	12	270,743	874	856,992	1,333	3,357,892	24.9

<sup>a</sup> Allotment coverage as a percent of the total land area owned or managed by the agency within each subcategory.

<sup>b</sup> Data for 2004-2007 provided by J. Begley, U.S. Forest Service.

<sup>c</sup> Data presented for Umatilla National Forest represent land coverage within Washington only.

<sup>d</sup> Data for 2011 provided by P. Ryan, Washington Department of Natural Resources. Data are listed according to WDNR region and include both grazing leases and permit ranges. Although leases and permit ranges are not specified according to type of livestock, almost all livestock using these lands are cattle.

<sup>e</sup> Data for 2010 provided by D. Peterson, U.S. Bureau of Land Management. The dividing line between eastern and western Washington is the crest of the Cascades Mountains.

<sup>f</sup> Data for June 2011. Data include both lands owned and lands controlled. The dividing line between eastern and western Washington is the crest of the Cascades Mountains.

Table 18. Annual death losses of livestock from different causes and their monetary values for Washington in 2004-2005 (NASS 2005, 2006).

Causes of losses	Cattle <sup>a,b</sup>	Calves <sup>a</sup>	Sheep <sup>a</sup>	Lambs <sup>a</sup>
Non-predator losses (no. of head)				
Digestive problems	4,000	5,200	200	100
Respiratory problems	3,000	8,500	200	200
Metabolic problems	2,600	300	100	100
Mastitis	1,400	-	-	-
Other diseases	1,200	400	-	-
Calving/lambing problems	1,300	3,200	200	-
Lameness/injury	2,400	300	-	-
Weather-related	300	800	-	-
Old age	-	-	800	-
Theft	300	-	-	-
Poisoning	100	-	-	-
Other non-predator <sup>c</sup>	1,400	700	400	100
Unknown non-predator <sup>d</sup>	2,100	2,000	200	100
Total non-predator losses	20,100	21,400	2,100	600
Value of all non-predator losses (\$)	20,703,000	8,025,000	258,000	35,000
Predator losses (no. of head)				
Coyotes	-	600	500	1,000
Dogs	-	-	100	300
Cougars and bobcats	200	600	200	-
Bears	-	-	-	100
Other predators	300	300	100	-
Unknown predators <sup>e</sup>	400	100	-	-
Total predator losses	900	1,600	900	1,400
Value of all predator losses (\$)	927,000	600,000	111,000	81,000
Losses from all causes (no. of head)	21,000	23,000	3,000	2,000
Value of all losses (\$)	21,630,000	8,625,000	369,000	116,000

<sup>a</sup> Data for cattle and calves are from 2005; data for sheep and lambs are from 2004. Cattle include beef and dairy cattle as well as cattle in feedlots.

<sup>b</sup> Cattle are defined here as all cows, bulls, steers, and heifers weighing over 500 pounds.

<sup>c</sup> Includes accidents, fire, starvation, dehydration, etc.

<sup>d</sup> Exact cause of death was unidentifiable.

<sup>e</sup> Species of predator was not determined.

### Economic Concerns of Washington's Ranching Industry over Wolves

The reestablishment of wolves in Washington will affect some ranchers living in or near wolf-occupied areas through impacts to their livestock and/or property management (Unsworth et al. 2005). Concerns about possible economic impacts that have been expressed by ranchers include:

- 1) Depredation of ranch animals, including possible deaths and injuries of cattle, sheep, dogs, and other ranch animals resulting from wolf attacks.
- 2) Possible non-lethal physiological impacts on ranch animals, including possible weight loss, stress, and lower birth rates in ranch animals resulting from the presence of wolves nearby.

- 3) Changes in forage use, if ranchers needed to move livestock more often or had to move them to alternative grazing sites to avoid depredation.
- 4) Need for additional labor, if they had to increase supervision of ranch animals and invest time in reporting depredation losses.
- 5) Increased expenditures, including purchasing of replacement stock and proactive non-lethal control measures, such as herding and guarding dogs, fencing, fladry, and noise deterrents, as well as increased wear on vehicles and fuel use.
- 6) That ranches affected disproportionately by wolves might go out of business or experience reduced market values.

In many cases, wolf-related losses may cause disproportionately greater financial hardship for extra small or small producers (which comprise the large majority of the cattle and sheep operations in Washington; see Section B) than for larger producers.

In addition to these possible costs, some positive impacts for livestock operations could result from wolf presence. These could include reducing populations of coyotes and other predators, thereby reducing predation on livestock by those species. Improved forage conditions for livestock could result if elk and deer populations were redistributed off ranch properties by wolves; however, if elk and deer were moved onto grazing land by wolf presence, then there could be negative impacts to livestock forage availability.

Wool, meat, and other products can be marketed for higher prices when certified as being raised using “predator friendly” practices (Predator Friendly 2008). Under this approach, livestock producers commit to not kill wolves and other predators during their ranching operations and instead deal with conflicts using non-lethal means. Although operators may incur some additional losses in their herds or flocks, higher prices for the product are intended to offset the difference. The number of producers using this type of marketing remains quite small, but there is potential for expansion.

#### Predicting Losses of Ranch Animals in Washington Due to Wolves

Predicting the numbers of ranch animals that might be killed annually in Washington as wolves become reestablished is difficult because of the many uncertainties over where and how many wolves will eventually inhabit the state, the frequency that they will interact with livestock, problems in determining actual versus confirmed numbers of livestock killed, and ongoing improvements in the adaptive management responses of ranchers and wildlife agencies. Nevertheless, this section presents some rough estimates of confirmable losses and their monetary value that might be expected to occur based on analyses of depredation data from Idaho, Montana, and Wyoming for 1987 to 2007 (Table 5). To obtain these estimates, separate regression lines were fitted to the loss data for cattle, sheep, and dogs from each state (Figure 18). Low and high estimates of losses for Washington were then derived for four population size categories (50, 100, 200, and 300) of wolves using the shallowest and steepest of the three regression lines for Idaho, Montana, and Wyoming, respectively. These population size categories roughly correspond to the following numbers of packs and successful breeding pairs, as described in Table 19: 50 wolves, 5-8 packs, and 5-7

successful breeding pairs; 100 wolves, 9-16 packs, and 8-13 successful breeding pairs; 200 wolves, 18-33 packs, and 12-21 successful breeding pairs; 300 wolves, 27-49 packs, and 19-34 successful breeding pairs.

The projections of depredations presented here assume that interactions between livestock and wolves in Washington will be similar to those in neighboring states. However, this assumption must be viewed cautiously because of differences in livestock numbers (especially the lower number of sheep in Washington) and distribution, husbandry methods, availability of natural prey, land use, and human densities. In addition, these projections represent average expected losses per year and do not demonstrate the annual variation in depredations that commonly occurs in Idaho, Montana, and Wyoming.

Low and high hypothetical predictions of confirmable annual losses of ranch animals for Washington are presented in Table 19 for each of four population size categories of wolves. Total populations of 50 and 100 wolves are expected to depredate very small numbers of livestock. Fifty wolves may kill about 1-6 cattle and 7-16 sheep per year, with annual take perhaps doubling for 100 wolves. Larger wolf populations will likely kill greater numbers of livestock, with projections of 6-28 cattle and 20-60 sheep killed annually by 200 wolves, and 12-67 cattle and 22-92 sheep killed annually if 300 wolves became reestablished (Table 19). However, sheep losses are expected to be on the low end of these estimates because sheep numbers are much smaller in Washington than in Idaho, Montana, and Wyoming (see NASS 2004). Even at a population of 300 wolves, these levels of depredations represent 4% or less of the annual predator-caused death losses experienced by Washington cattle and sheep producers. Depredations on horses, other livestock, and guarding/herding dogs are expected to be minor for each of the wolf population size categories.

Table 19 presents estimates of the annual monetary worth of ranch animals that may be depredated by wolves in Washington in the future under different wolf population sizes ranging from 50-300 wolves. To determine this value, average monetary values (in current dollars for 2007) of livestock and dogs were assigned as follows:

- **Cattle** - \$669 per head, based on the average fall (September to November) value of 600-pound calves using Washington auction prices for 500- to 600-pound steer calves during 2004-2007 (data from Livestock Market Information Center; J. S. Neibergs, pers. comm.). This represents the earning potential of the animal rather than its value at the time of death. Calf value is used because calves are expected to be the age class of cattle most commonly killed by wolves (Chapter 4, Section A).
- **Sheep** - \$137 per head, based on the average value of sheep sold across all size and weight classes in Washington in 2007 (NASS 2007c). This represents the earning potential of the animal rather than its value at the time of death.
- **Horses** - \$1,775 per animal, based on an average value in 2004 of \$1,620 for ranch horses reported by Unsworth et al. (2005) and converted to current dollars for 2007.
- **Dogs** - \$625 per animal, based on the approximate cost of a 6-month-old guarding dog (Great Pyrenees, Akbash, or Great Pyrenees-Akbash cross) in Idaho, Montana, and Wyoming in 2008 (J. Timberlake, pers. comm.).

1 Figure 18. Relationships between confirmed losses of (a) cattle, (b) sheep, and (c) dogs and minimum  
 2 fall wolf numbers in Idaho, Montana, and Idaho through 2007 (plotted from data in Table 5).

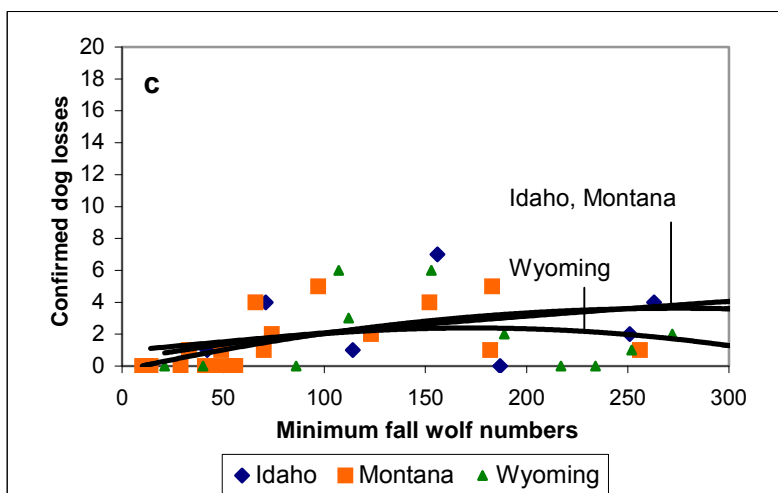
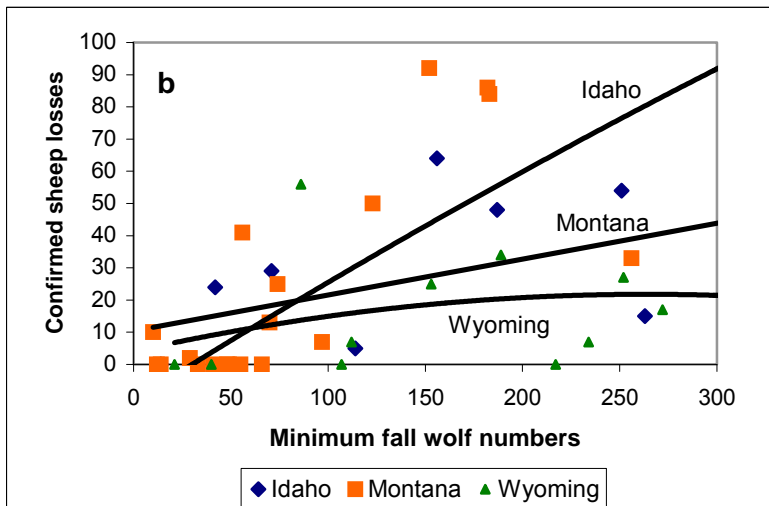
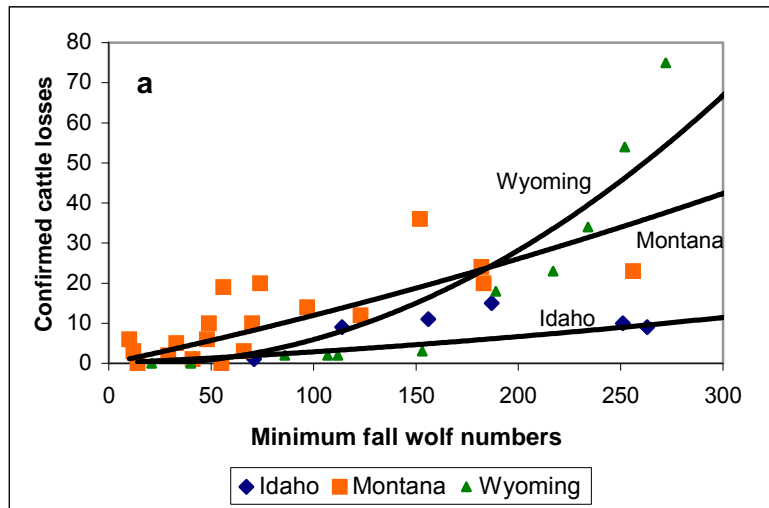


Table 19. Predicted estimates of confirmable depredations of livestock and domestic dogs and their estimated monetary values (in current dollars for 2007) for four different future population size categories of wolves in Washington. Because of the absence of biological and depredation data on wolves living in Washington, numbers presented here should be considered as very rough hypothetical estimates.

Future number of wolves present	Population size category			
	50	100	200	300
Estimated no. of future confirmed cattle depredations per year <sup>a</sup>	1-6	2-12	6-28	12-67
Total value of losses per year <sup>b</sup>	\$669-8,028	\$1,338-16,056	\$4,014-37,464	\$8,028-89,646
Estimated no. of future confirmed sheep depredations per year <sup>a</sup>	7-16	14-35	20-60	22-92
Total value of losses per year <sup>b</sup>	\$960-2,190	\$1,920-4,795	\$2,740-8,220	\$3,010-12,600
Estimated no. of future confirmed horse and other livestock depredations per year <sup>a</sup>	0-1	0-1	0-2	0-2
Total value of losses per year <sup>b</sup>	\$0-1,775	\$0-1,775	\$0-3,550	\$0-3,550
Estimated no. of future confirmed dog depredations per year <sup>a</sup>	1-2	2	2-3	1-4
Total value of losses per year <sup>b</sup>	\$625-1,250	\$1,250	\$1,250-1,875	\$625-2,500
Total value of all future confirmed losses per year	\$2,254-13,243	\$4,508-23,876	\$8,004-51,109	\$11,663-108,296

<sup>a</sup> Numbers represent the estimated numbers of livestock and dogs that might be confirmed as being killed annually by different sizes of wolf populations. Confirmed losses are those determined by USDA Wildlife Services, WDFW, or another authorized entity. Unconfirmed kills are excluded from these estimates.

<sup>b</sup> Numbers represent the combined estimated monetary value of all losses annually per category in current dollars for 2007. Average values per species are described in the text. For cattle, the maximum value of losses is doubled to reflect the value of compensation payments that would be required if all losses occur on grazing sites of 100 acres or more (Chapter 4, Section G).

For smaller populations of 50 and 100 wolves, the annual monetary value of confirmed losses of livestock and ranch dogs (including the higher compensation payments for cattle killed on grazing sites of 100 acres or more; Chapter 4, Section G) is expected to range from about \$2,254-13,243 and \$4,508-23,876, respectively. Monetary losses are expected to increase as wolf populations become larger and are projected to reach an estimated \$11,663-108,296 for about 300 wolves (Table 19). As noted above, these values are probably overestimated because not all cattle losses are expected to occur on grazing sites of 100 acres or more and because sheep losses are expected to be at the lower end of the range of estimates presented here. Overall, most of the monetary value of losses is expected to result from cattle deaths, especially when larger wolf populations are present.

For comparison, Table 20 provides a summary of average annual payments of compensation payments made to livestock producers in other wolf recovery areas and states during different stages of wolf recovery. These might correspond to wolf population numbers or breeding pairs of wolves at different stages of recovery in Washington.

Table 20. Average total payments per year for confirmed and probable livestock losses due to wolf predation by wolf population size category during early recovery phases in the northern Rocky Mountain recovery region, Wisconsin, and Michigan where data was available for payments and numbers of wolves and breeding pairs of wolves.

Wolf population size category	Northern Rocky Mountain Recovery Region			States		
	Northwestern Montana <sup>a</sup>	Central Idaho <sup>a</sup>	Greater Yellowstone Area <sup>a</sup>	Montana <sup>b,c</sup>	Wisconsin <sup>d,e,f</sup>	Michigan <sup>d,f</sup>
<b>No. wolves<sup>g,h</sup></b>						
0-25	\$1,593				\$67	
25-50	\$1,908	\$4,777	\$1,221		\$231	
50-75	\$4,749	\$4,169			\$900	
75-100	\$7,250		\$11,498		\$1,775	
100-125	\$11,344	\$6,380	\$6,982			
125-150	\$6,495				\$3,600	\$613
150-175	\$17,320	\$17,711				\$400
175-200		\$23,163	\$19,667		\$2,198	
200-225			\$26,850		\$13,472	\$850
225-250	\$24,612				\$3,030	\$2,200
250-275		\$7,904	\$39,162		\$2,309	
275-300	\$19,622 <sup>g</sup>	\$9,807		\$83,000		\$3,649
300-325			\$29,938	\$141,462		\$4,720
325-350			\$74,390		\$18,266	
<b>No. breeding pairs<sup>g,h</sup></b>						
1	\$865				NA	NA
2	\$2,150				NA	NA
3	\$4,100	\$4,777			NA	NA
4	\$2,615		\$1,221		NA	NA
5	\$6,912				NA	NA
6	\$5,187	\$4,169	\$6,347		NA	NA
7	\$4,145				NA	NA
8			\$7,616		NA	NA
9			\$11,498		NA	NA
10		\$15,751			NA	NA
11	\$6,495				NA	NA
12	\$14,332				NA	NA
13			\$26,850			
14		\$8,855	\$19,667			

<sup>a</sup> Defenders of Wildlife (2009).

<sup>b</sup> Reflects payments made by Defenders of Wildlife from January - April 15, 2008 and by the state of Montana from April 15 and December 31, 2008 (including 100% for both confirmed and probable).

<sup>c</sup> Reflects payments made by the state of Montana in 2009.

<sup>d</sup> Ruid et al. (2009).

<sup>e</sup> Payments corresponding to numbers of successful breeding pairs were not available for Wisconsin and Michigan.

<sup>f</sup> Total claims paid for wolf depredations losses, minus payments for dogs, chickens, and farmed deer in order to compare with livestock definition in WDFW wolf conservation and management plan.

<sup>g</sup> Wydeven et al. (2009b).

<sup>h</sup> USFWS et al. (2011).

### Physiological Impacts on Livestock

In addition to depredation, the presence of wolves near livestock may cause behavioral changes in livestock that result in physical effects (Howery and DeLiberto 2004, Lehmkuhler et al. 2007). Livestock may gain less weight because wolves force them away from suitable grazing habitat and water sources or because of greater energy expenditures due to wolf-related agitation and movement. These problems may also lower birthrates by reducing conception levels and causing miscarriages. Recent studies have shown that cattle increase their movements and avoid grazing sites of high quality in response to wolf presence (Laporte et al. 2010, Muhly et al. 2010b). While these responses imply increased energetic costs to the cattle involved, they have not yet been proven to cause reductions in weight gain and reproduction. Both problems can also result from other causes, such as poor forage or weather conditions, making it difficult to measure the true impacts of wolves. Because of these uncertainties, this analysis does not attempt to quantify the economic impacts of such outcomes.

### Changes in Grazing Methods

Some ranchers may feel compelled to modify their grazing methods in an effort to avoid problems with wolves. This could involve herding or hauling livestock to different portions of grazing allotments, which in some instances may result in penalties from land management agencies for violating allotment grazing plans. Avoidance of wolves may lead some ranchers to bring livestock off the range prematurely or to provide supplemental feeding to delay turnout. Estimates of the extent and frequency of these activities do not exist for other areas with wolves, such as Idaho, Montana, and Wyoming. Therefore, this analysis does not attempt to quantify the economic impacts of modifying grazing activities in response to the reestablishment of wolves in Washington.

### Need for Additional Ranch Labor

Ranchers and their employees frequently spend additional time managing livestock operations to avoid depredations by wolves. This can include increased supervision of herds, moving livestock to different grazing areas, implementing non-lethal techniques to reduce conflicts, treating injured livestock, and checking animals for pregnancy that may have aborted due to wolves (Unsworth et al. 2005, Lehmkuhler et al. 2007). These activities may require that less time be spent on other important activities such as ranch maintenance and improvement. Some ranchers may hire additional employees specifically to herd livestock when wolves are in the area. Estimates of the extent and frequency of these types of responses are not available for neighboring states. Therefore, this analysis does not attempt to quantify these future costs for Washington.

To receive compensation for depredations, ranchers also spend time contacting wildlife agents, waiting for them to inspect a kill, completing the necessary paperwork, and conducting any further correspondence or negotiations to ensure payment. Thompson (1993) estimated that for each confirmed and probable kill, this process required an average of 10 hrs of time by a rancher or an employee. Based on hourly wage rates of \$11.07 for livestock workers in Washington (NASS 2007b), each confirmed or probable wolf kill would require that a rancher spend on average \$110 preparing compensation claims. However, this figure is an underestimate for two reasons (Unsworth et al. 2005). First, it does not consider the higher wages of ranch managers, who are probably more likely to fill out compensation claims. Second, it does not consider time spent by

1 ranchers investigating unconfirmed kills, although these would require less time because they do not  
2 qualify for compensation and therefore do not result in claims being filed.

### 3 4 Additional Expenditures on Ranch Supplies

5  
6 Some ranchers may devote extra resources to protecting their livestock from wolves. Non-lethal  
7 control methods may require the purchasing of fencing, non-lethal munitions, electronic hazing  
8 devices, fladry, or other equipment, as well as additional herding and guarding dogs and associated  
9 supplies (Bangs et al. 2006, Shivik 2006, Stone et al. 2008). Increased efforts to inspect livestock on  
10 ranges with wolves, haul livestock to different grazing sites, and remove livestock carcasses likely  
11 require greater use of fuel and increased wear on ranch vehicles. Ranchers may need to buy camping  
12 equipment to outfit herdsmen or range riders for remaining on the range with livestock. Livestock  
13 agitated by wolves may damage fencing, which then needs to be repaired. Cost estimates for these  
14 types of expenditures do not exist for other areas with wolves, such as Idaho, Montana, and  
15 Wyoming. Therefore, this analysis does not attempt to calculate the economic costs for material  
16 acquisitions and costs.

### 17 18 Property Value Impacts

19  
20 Some ranchers believe that ranches disproportionately affected by wolf depredation may be forced  
21 out of business and that the market values of ranches experiencing wolf impacts will be reduced  
22 because of the perception that these properties are of lower desirability (Unsworth et al. 2005).  
23 There is no confirmed evidence of either of these situations occurring in Idaho, Montana, or  
24 Wyoming (S. Nadeau, pers. comm.; C. Sime, pers. comm., M. Jimenez, pers. comm.), therefore  
25 neither is expected to occur in Washington. Furthermore, the presence of wolves has not resulted in  
26 the implementation of any endangered species-related restrictions on the uses of private land in  
27 Idaho, Montana, or Wyoming that might result in lowered land values. Such restrictions are also not  
28 expected to occur in Washington.

### 29 30 Positive Impacts from Wolf Reestablishment

31  
32 Most of the potential economic impacts from wolves represent costs to ranchers and farmers.  
33 However, wolves may also benefit some livestock operations by reducing the abundance of coyotes,  
34 thereby lowering coyote predation on livestock. Coyotes were responsible for 40% of the  
35 confirmed calf death losses (valued at \$225,000), 56% of the sheep death losses (\$62,000), and 71%  
36 of the lamb death losses (\$58,000) in Washington in 2004 or 2005 (Table 18). Another possible  
37 benefit could come from wolves redistributing elk and deer on ranchlands and grazing allotments,  
38 potentially resulting in reduced use of grass and other forage and thereby leaving more food for  
39 livestock. Both of these scenarios have been detected in natural habitats at Yellowstone National  
40 Park (Chapter 6, Section A) and could possibly occur in Washington. An additional potential  
41 benefit is that wolf predation may reduce the occurrence of some diseases in wild ungulates (Chapter  
42 5, Section A), which could reduce disease transmission to livestock present in the same locations  
43 (Stronen et al. 2007). None of these benefits have been quantified in economic terms for any  
44 location, making it difficult to place a value on them. Many coyote-caused losses probably occur in  
45 parts of the state that are unlikely to be recolonized by wolves. The benefits from these three  
46 impacts would probably be localized and relatively minor.

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## Summary

Reestablishment of wolves in Washington will likely result in differing costs for livestock producers living in or near occupied wolf range, with some producers more affected than others. Financial impacts to individual producers will depend not only on the numbers of depredations experienced but also on non-lethal physiological impacts on livestock, increased expenditures on ranch supplies, and additional labor needs. This analysis provides cost approximations only for confirmed losses of ranch animals and time spent preparing compensation claims. For populations of 50-300 wolves, these costs together could range from several thousand dollars to possibly more than \$110,000 annually for producers as a whole in the state. Costs of other impacts are not quantified in this analysis due to a lack of adequate information. These costs would be partially offset by compensation payments for confirmed and probable wolf-caused livestock deaths. The Defenders of Wildlife Proactive Carnivore Conservation Fund is available to help defray the costs of non-lethal deterrents for small numbers of producers in Washington.

Wolf numbers between 50 and 100 animals should pose little detriment to the state's livestock industry as a whole. At these population levels, the vast majority of producers will probably experience few if any annual costs, whereas a few individual producers could be more affected. As wolf populations become larger and more widely distributed, financial impacts to more producers are likely.

## **C. Big Game Hunting**

Healthy and abundant prey populations are important for maintaining hunting opportunities that contribute to many local economies in Washington, especially in more rural regions. The challenge for wildlife managers is to manage for healthy ungulate population levels that also sustain wolves, other carnivores, harvest opportunities for the public, and subsistence and ceremonial needs of treaty tribes.

### Big Game Hunting Statistics for Washington

Hunting, especially for big game, is an important recreational activity in Washington. The 2006 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation, which is based on household interviews nationwide, estimated that 187,000 residents of Washington, or 3.8% of the state's population aged 16 years old and older, purchased hunting licenses (for either big or small game, or both; USFWS and USCB 2008). This is below the national average of 5.5% of the population aged 16 years and older. An estimated 182,000 hunters hunted in Washington in 2006, with an estimated 179,000 residents and 3,000 non-residents participating. Hunters spent nearly 2.13 million days hunting for all species in the state in 2006. Washington residents spent an additional 285,000 hunting days, or 12% of their total effort, hunting outside of the state. These numbers are slightly lower than those derived from WDFW's data files, which indicate that about 196,000 residents and 4,900 non-residents bought hunting licenses, special permits, and special hunt applications in 2006. However, these figures include buyers who did not actually participate in hunting during the year.

Big game hunting represents some of the most highly valued hunting in Washington, with an estimated 90% of hunters hunting ungulates in 2006 (USFWS and USCB 2008). By comparison,

only an estimated 23% and 11% of hunters sought small game and migratory birds, respectively. Seventy-nine percent of total hunter days involved big game hunting, 14% small game hunting, and 7% migratory birds in 2006.

Deer and elk hunting are the predominate forms of big game hunting in Washington, both in terms of the number of hunters participating and total days spent hunting. Numbers of deer hunters and deer hunting days have averaged about 141,500 and 845,000 per year, respectively, during the past decade (WDFW 1997-2006). Despite some sizeable yearly increases and decreases, deer hunter numbers remained almost stable (increase of 0.7%) from 1997 to 2006, whereas hunting days decreased 18.8% (Figures 19, 20). Deer harvest has remained robust, averaging 38,100 deer annually during the past decade, which included a 47% increase from 1998 to 2004 (Figure 21). Hunter success rates (i.e., combined for general and special permit seasons, all weapon types, and antlered and antlerless harvest) closely tracked harvest trends during this decade, with success averaging 27.0% and strongly increasing from 1998 (20.3%) to 2004 (30.4%) (Figure 21). Annual harvest data for each type of deer are available only from 2001 to 2006, when an average of 14,082 black-tailed deer, 13,709 white-tailed deer, and 12,584 mule deer were killed per year. During the past decade, combined deer harvests were highest in WDFW's eastern (30% of the statewide harvest) and southwestern (25%) regions, and lowest in the south-central (9%) and North Puget Sound (6%) regions (Figures 22, 23).

For elk, numbers of hunters and hunting days have averaged about 74,400 and 412,400 per year, respectively, during the past decade in Washington. Both figures have shown net increases of 15.4% and 19.0%, respectively, during this period, although both have been in gradual decline since 2000 (Figures 19, 20). Despite these declines, elk harvest has remained strong, averaging 7,390 animals annually over the past decade. Harvests were lowest in 1997 (4,919 elk) and 1998 (5,858 elk), but have varied between about 7,100 and 8,700 animals since then, with a 48.6% increase occurring between 1998 and 2003 (Figure 21). Overall hunter success rates (i.e., combined for general and special permit seasons, all weapon types, and antlered and antlerless harvest) tracked harvest trends during this decade, with success averaging 10.1% overall and increasing from an average of 8.4% in 1997-1999 to an average of 10.8% in 2000-2006 (Figure 21). Elk harvests were highest in WDFW's south-central (37% of the statewide harvest) and southwestern (37%) regions, and lowest in the North Puget Sound (2%) and north-central (1%) regions (Figures 22, 23).

Hunting opportunities for moose, bighorn sheep, and mountain goats in Washington are far more limited than for deer and elk. All three species are hunted only through special permit drawings, with fewer than 100 licenses issued annually for each (Figure 24). Numbers of licenses issued since 1997 have increased for moose and sheep, but have decreased for goats. Numbers of hunter days per species are also small, totaling fewer than 900 days per year for moose with an increasing trend over the past decade, fewer than 300 days per year for goats and declining, and fewer than 200 days per year for sheep and increasing (Figure 25). During the past decade, annual harvests have numbered fewer than 100 moose and are increasing, fewer than 40 sheep and are increasing, and fewer than 40 goats and are decreasing (Figure 26). Hunter success rates have reached 80-100% for all three species in nearly every year since 1997 (Figure 27).

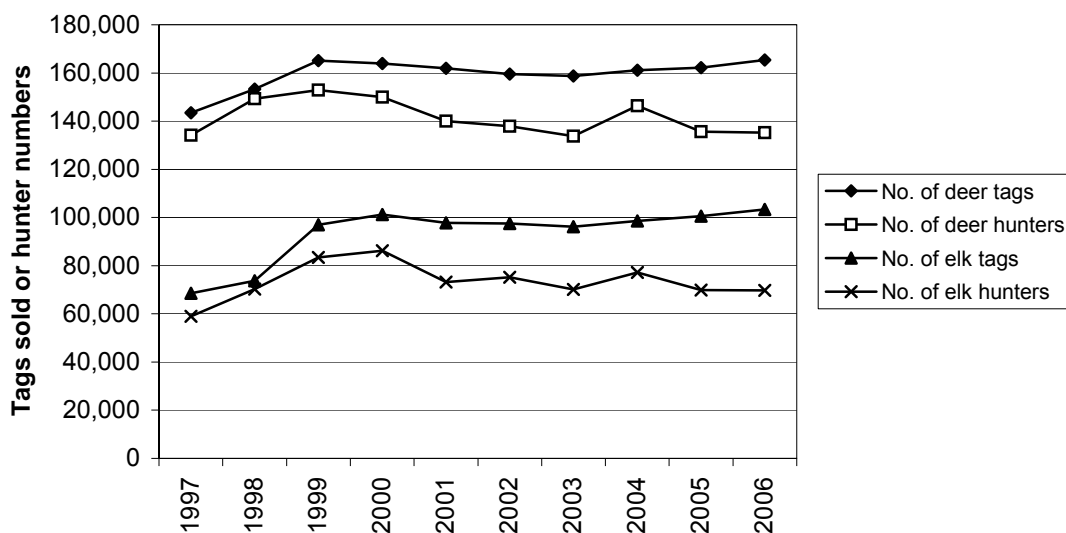


Figure 19. Trends in numbers of tags sold and hunters participating in general deer and elk seasons (all weapons) statewide in Washington, 1997-2006.

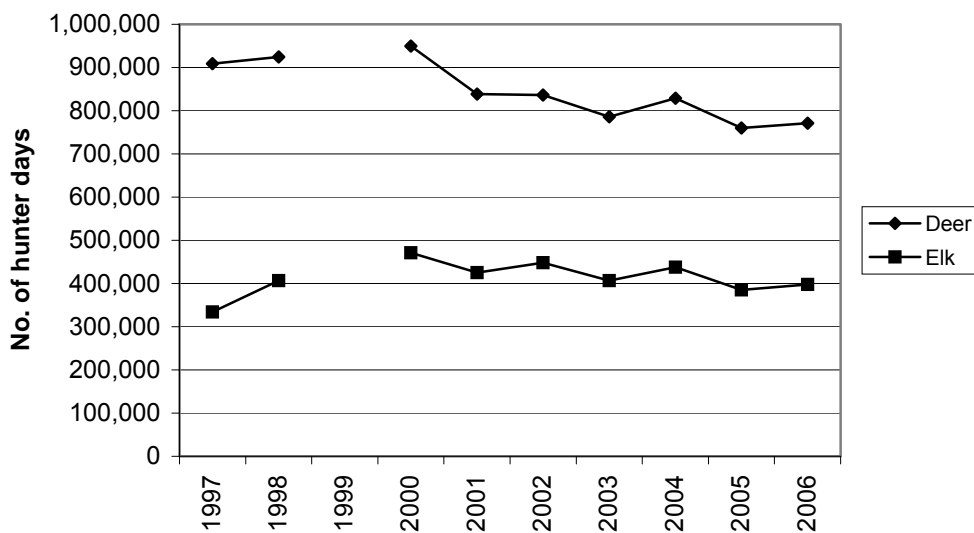


Figure 20. Trends in numbers of hunter days during general deer and elk seasons (all weapons) statewide in Washington, 1997-2006 (excluding 1999).

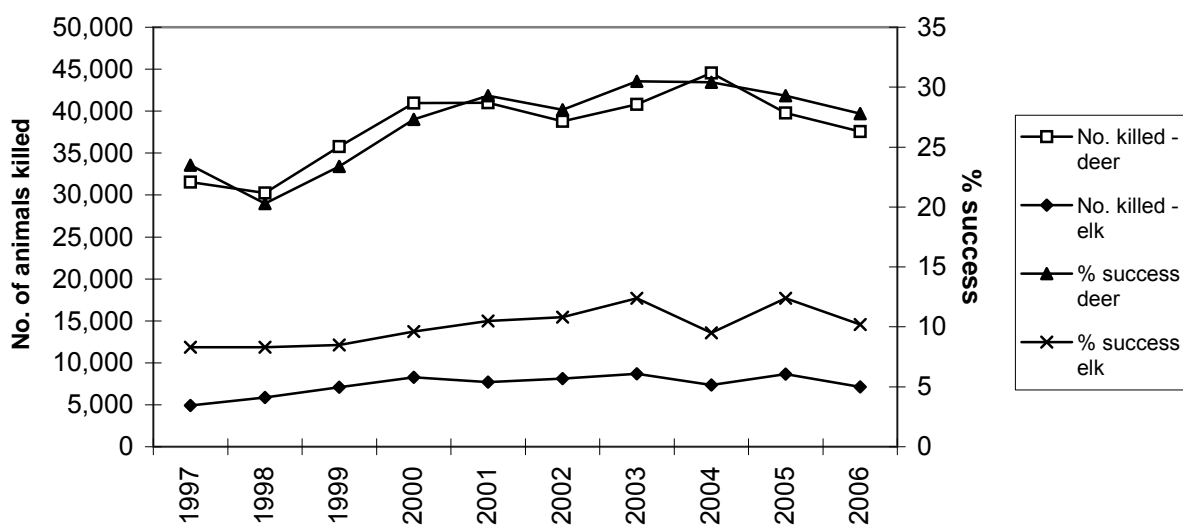


Figure 21. Trends in statewide numbers of deer and elk killed and hunter success during general and permit seasons (all weapons) combined in Washington, 1997-2006.

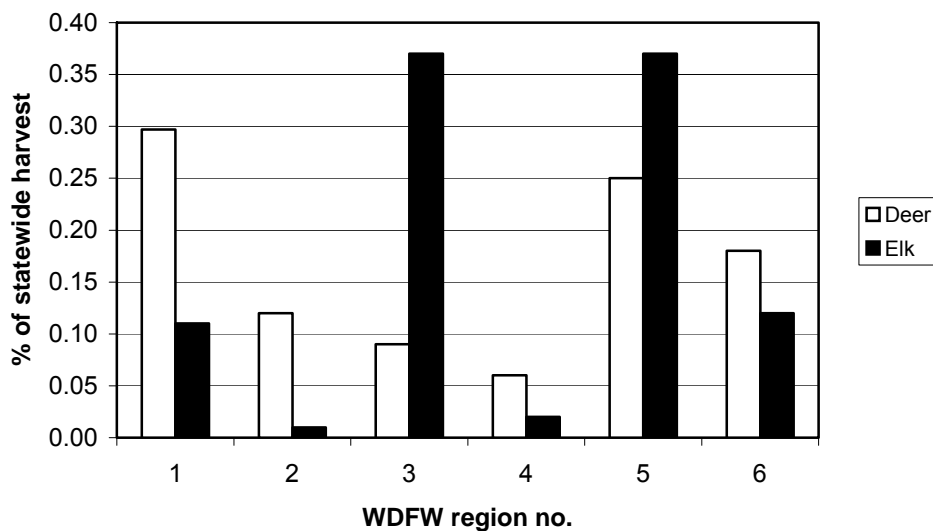


Figure 22. Percent of statewide deer and elk harvest (all weapons) according to WDFW region number, 1997-2006. Region boundaries are depicted in Figure 23.

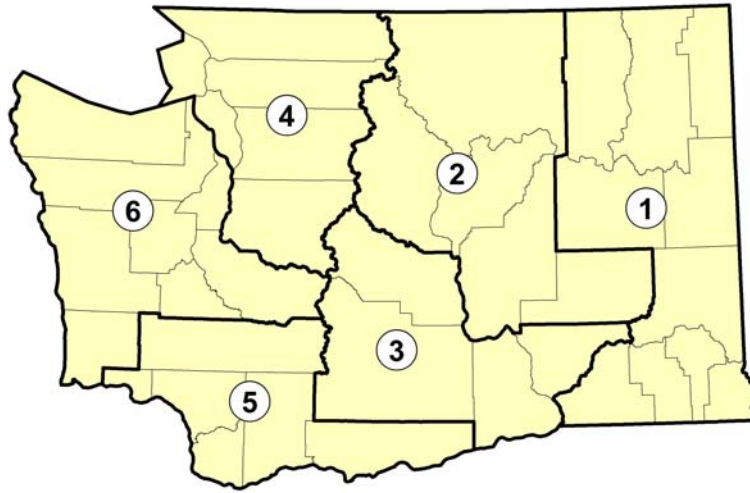


Figure 23. Map of WDFW's six administrative regions. Map numbers correspond to designated region numbers.

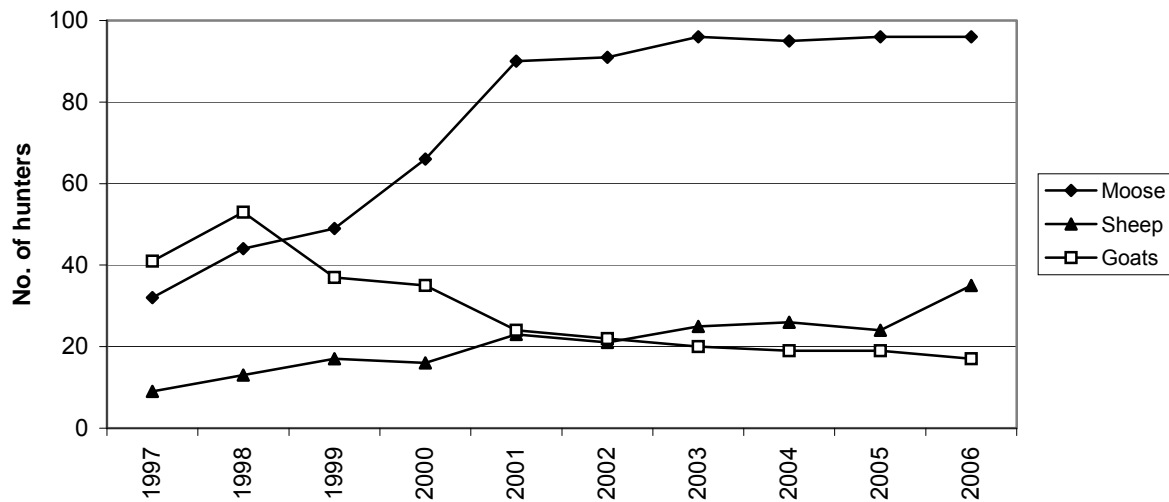


Figure 24. Trends in hunter numbers for moose, bighorn sheep, and mountain goats in Washington, 1997-2006.

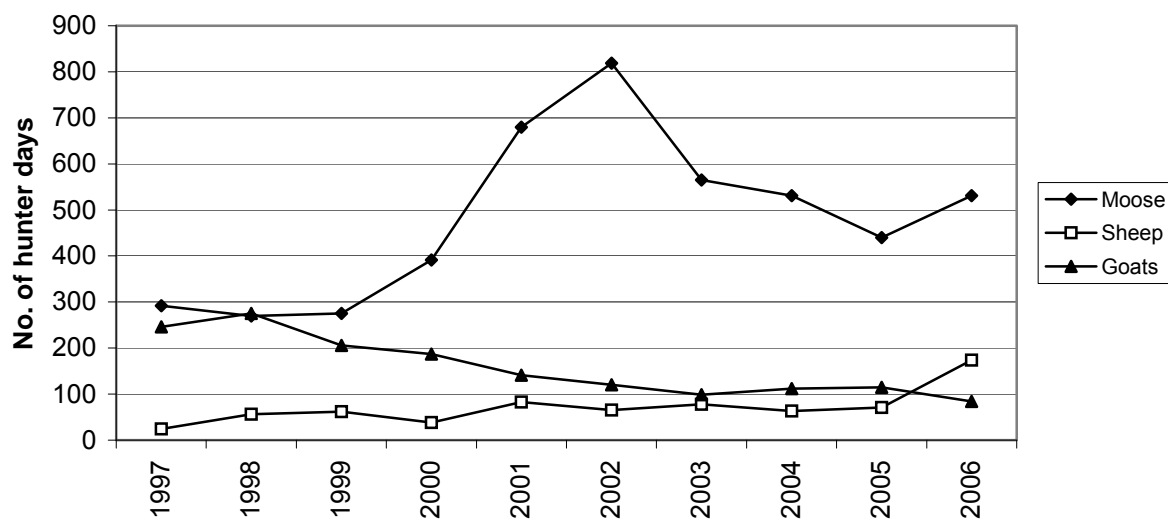


Figure 25. Trends in numbers of hunter days for moose, bighorn sheep, and mountain goats in Washington, 1997-2006.

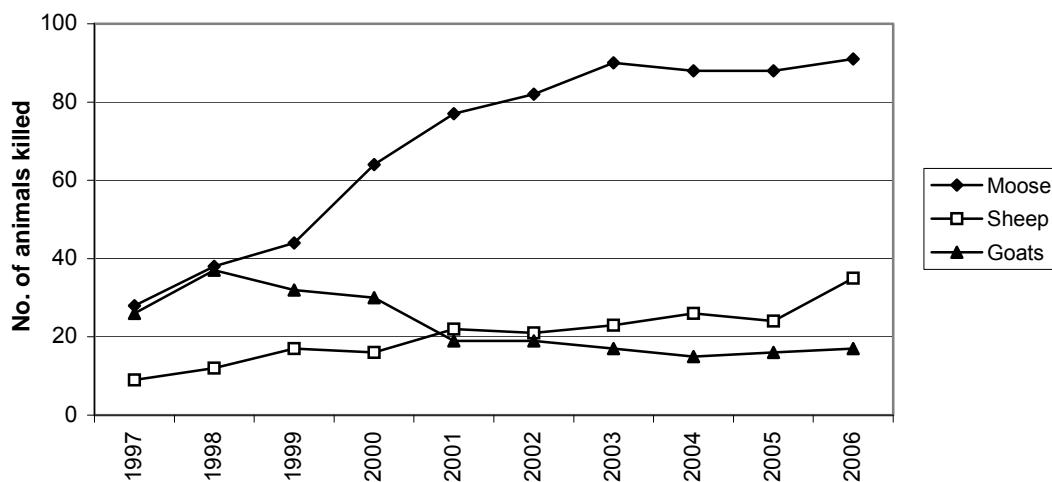


Figure 26. Trends in hunter harvest of moose, bighorn sheep, and mountain goats in Washington, 1997-2006.

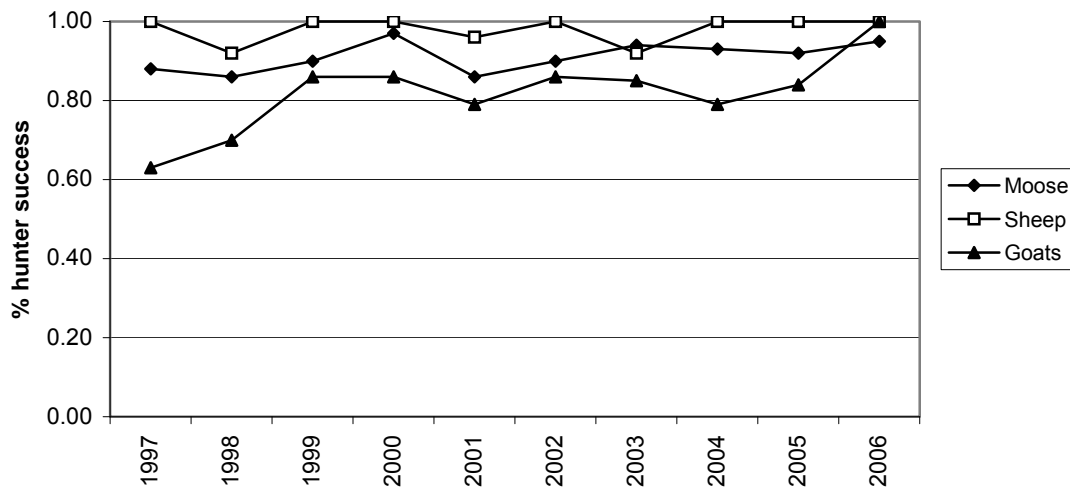


Figure 27. Trends in hunter success for moose, bighorn sheep, and mountain goats in Washington, 1997-2006.

#### Hunter Expenditures in Washington

Washington's hunting community spent an estimated \$313 million on hunting-related expenses in 2006 (Table 21; USFWS and USCB 2008). This corresponds to an average of \$1,598 per hunter per year or about \$147 per hunter day. Equipment and trip-related costs accounted for about 60% and 24% of all expenses, respectively (Table 21). Hunting-related expenditures in 2006 were strongly skewed toward big game (86% of total expenditures), with smaller amounts for small game (5%), migratory birds (4%), and others (USFWS and USCB 2008).

Washington attracts few out-of-state hunters compared with nearby states. Non-resident hunters comprise fewer than 2% of the hunters and about 0.1% of the hunter days expended in Washington, whereas in 10 other western states (excluding California and Hawaii), non-residents comprise on average 28% (range = 8-51%) of the hunters and 20% (range = 3-48%) of the hunter days expended (Figure 28; USFWS and USCB 2007). Washington's non-resident license fees are competitive with other states and the state has no special restrictions limiting the number of out-of-state hunters. However, out-of-state big-game hunters are more likely to visit other western states such as Idaho, Colorado, Wyoming, and Montana, where larger ungulate populations, land mass, and lower human populations allow for more opportunity, higher success rates, and better overall hunting value. As a result, non-resident hunters contribute less to Washington's economy than they do to other western states' economies.

Table 21. Estimated total expenditures by hunters and average expenditures per hunter for all types of hunting combined in Washington in 2006 (from USFWS and USCB 2008).

Category of expenditure	Total amount	Average amount per hunter <sup>a</sup>
Food and lodging	\$33,083,000	\$169
Transportation	36,528,000	186
Other trip costs (land use fees, guide fees, heating and cooking fuel, other)	4,622,000	24
Total trip related	74,233,000	379
Hunting equipment (guns, ammunition, bows, dogs, other)	66,625,000	340
Auxiliary equipment (clothing, processing and taxidermy, optics, camping equipment, other)	44,120,000	225
Special equipment (boats, campers, cabins, trail bikes, other)	77,994,000	398
Total equipment	188,739,000	963
Other items (land leasing and ownership, licenses, other)	50,163,000	256
Total expenditures	\$313,134,000	\$1,598

<sup>a</sup> Based on an estimated total of 196,000 resident and non-resident hunters hunting each year in Washington. This number presumably includes some people who spent money on hunting activities and equipment, but did not actually hunt.

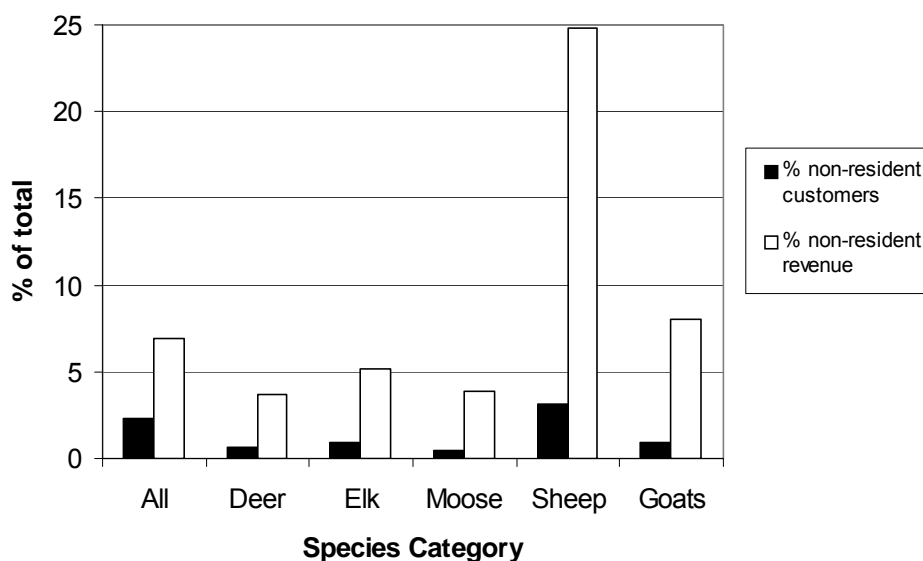


Figure 28. Representation of non-resident hunters as a percentage of total hunting customers in Washington and their contribution to WDFW hunting revenues, according to species and averaged for fiscal years 2002-2007. Customers are defined as anyone buying a hunting license or applying for a special permit, with no individual counted more than once. Some customers may not have hunted during the year. Revenue figures are based on fees collected for licenses, permits, and applications, but exclude monies from auctions and raffles.

## Hunting Revenue for WDFW

Revenues generated by WDFW's hunting program totaled about \$13.3 million in fiscal year 2007 and have expanded 9.8% since 2002 (Figure 29). License and other sales involving deer and elk are the two largest sources of hunting-related revenue for the agency and have also gradually increased since 2002 (6.8% for deer, 11.4% for elk; Figure 29). The existence of multi-species combination licenses makes it difficult to determine revenue generated by each species, but estimates based on the full cost of each license type involving these species indicate that deer hunting provides WDFW with more revenue than elk hunting (Figure 29). Revenues associated with both species have gradually increased since 2002. The agency derives considerably smaller amounts of revenue from the hunting of bighorn sheep, moose, and mountain goats (Figure 30). Revenues have been expanding for each of these species since 2002, especially for sheep.

About 7% of total WDFW hunting revenues is derived from non-resident hunters (Figure 28). For big game species, non-resident hunters contribute about 4% (for deer and moose) to 25% (for bighorn sheep) of the hunting revenues gathered per species by the agency.

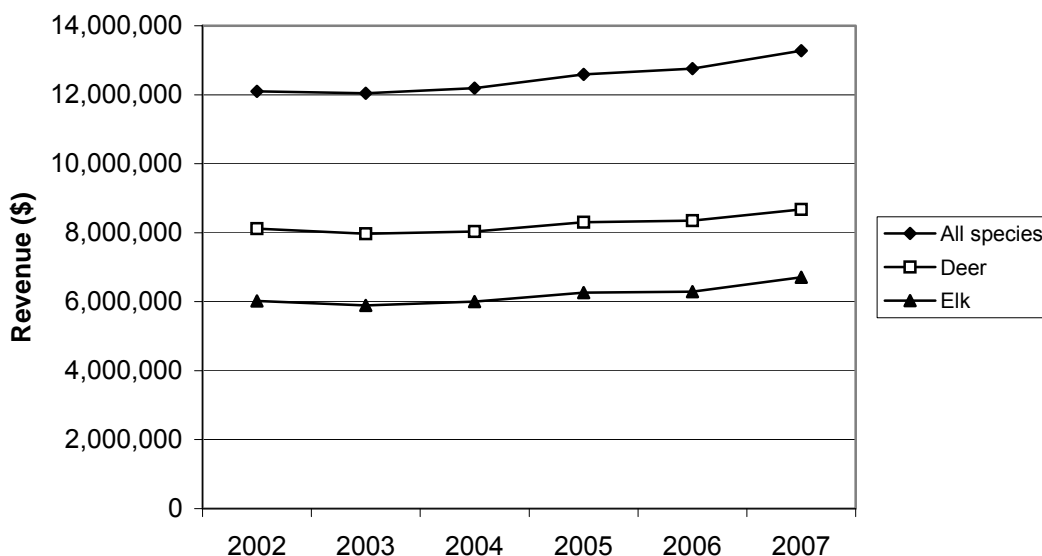


Figure 29. Trends in hunting revenues generated by the WDFW hunting program for all species combined (i.e., big game, small game, and migratory birds) and separately for deer and elk for fiscal years 2002-2007. Revenue figures come from both general and special permit seasons, and include monies collected from license fees, permit fees, application fees, raffles, and auctions. Revenues for deer and elk hunting overlap because they are summed from the full values of all license types (including multi-species combination licenses) involving each particular species.

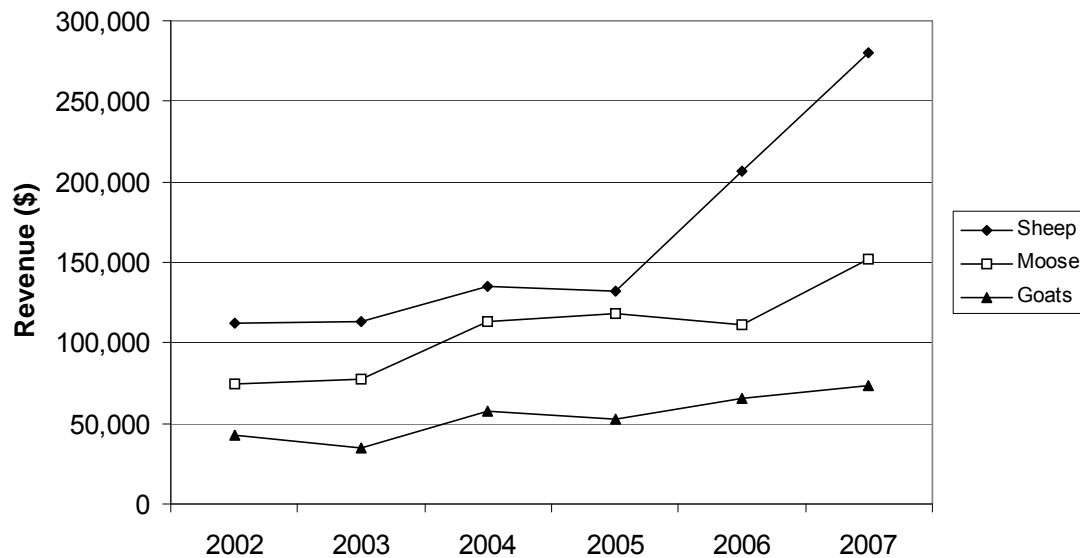


Figure 30. Trends in hunting revenues generated by WDFW for bighorn sheep, moose, and mountain goats for fiscal years 2002-2007. Revenue figures include monies collected from permit fees, application fees, raffles, and auctions.

### Guided Hunting

Commercial outfitters are primarily small independently owned businesses offering a variety of guided services (e.g., river running, fishing, hunting, camping, trail riding, packing, hiking, biking, climbing, and outdoor photography trips) to paying clients. Lodging is also provided by some outfitters. Outfitted trips usually qualify as a form of sustainable tourism because of their low impact on the environment and local culture, while helping to generate income and employment and benefiting the conservation of local ecosystems.

Washington's outfitter industry is considerably smaller than in some neighboring states such as Montana (see Nickerson et al. 2007) and Idaho, but quantified information on the size and economic contributions of outfitting in Washington is lacking. Detailed information is also lacking on the industry's client base, types of services rendered, and use of public versus private lands.

The Washington Outfitters and Guides Association (WOGA) represents a number of outfitting companies in the state, with membership currently totaling 29 companies (WOGA 2007). Nearly all members market multiple activities to clients, including 26 companies offering non-fishing and non-hunting activities, 12 offering hunting (mostly big game), 11 offering fishing, and nine offering river running and other water-related activities. Outfitter activities in general tend to be concentrated in eastern Washington (G. Ulin, pers. comm.). Among WOGA outfitters, north-central Washington (northeastern Cascades and the Okanogan), south-central Washington (southeastern Cascades), and Puget Sound are the three main regions of operation (WOGA 2007). Washington residents are thought to represent the majority, perhaps 60-67%, of the customer base for in-state outfitters (G. Ulin, pers. comm.). The establishment of several new companies during the past few years suggests that the industry as a whole is slowly growing.

Summer trips offering fishing, packing, camping, and other family- or group-related outdoor activities are the largest source of revenue for most land-based outfitters in Washington (G. Ulin, pers. comm.). Hunting trips are of lower importance as a source of income for most outfitters.

### Hound Hunting

Hunting with hounds was allowed for three game species in Washington through 2010, including cougars in a pilot study for six counties (Pend Oreille, Stevens, Ferry, Okanogan, Chelan, and Klickitat), raccoons statewide, and black bears causing timber damage in western Washington (by permit only). An estimated 500-700 hunters participated in these forms of hound hunting (D. Martorello, pers. comm.). Hound hunting for cougars was not reauthorized in 2011, but continues for raccoons and black bears. Hound hunters typically employ two to five dogs per party. Hounds can be either registered purebreds (e.g., Black & Tan, Walker, Redbone) or of mixed ancestry. Monetary values per dog range from several hundred dollars to more than \$5,000, but average about \$2,500 (D. Martorello, pers. comm.). Wisconsin is the only state that offers compensation for non-guarding/herding (i.e., hunting and other pet) dogs killed or injured by wolves.

### Recent Impacts of Wolves on Big Game Hunting in Other States

Summaries of wolf-related impacts on big game populations in other states are presented in Chapter 5, Section B.

To date, wolves have not resulted in any sizable losses of hunter opportunity in Montana, although seasons for antlerless elk in some locations (e.g., north Yellowstone, Gallatin, West Fork of the Bitterroot) have been reduced or eliminated to compensate for mortality from multiple sources including wolves and other factors causing lowered herd productivity (MFWP 2007b; C. Sime, pers. comm.). Many parts of the state offer liberal opportunities for elk harvest, including two-thirds of the hunting districts in southwestern Montana, all of which support wolves (J. Gude, pers. comm.). However, lethal wolf control in many of these areas to reduce conflicts with livestock may keep local wolf densities low enough to minimize impacts on elk herds. Wolf impacts on deer and other ungulates have not been well documented to date (C. Sime, pers. comm.). Montana Fish, Wildlife & Parks has not experienced any declines in hunting generated revenue, license sales, or hunter success on a statewide level because of wolf presence (C. Sime, pers. comm.).

Wolf impacts on big game hunting in Idaho have not been well quantified. IDFG (2010a) recently reported that 23 of 29 elk management zones in Idaho were within or above management goals for female elk, suggesting that harvestable surpluses of elk remain in most areas of the state. At least two elk management units (e.g., Lolo, Sawtooth) where wolves were the primary cause of death of female elk (IDFG 2010a) have experienced reductions in hunter harvest and participation since 2005 (Rachael 2010). IDFG (2008) speculated that wolf predation may be causing reductions in elk harvest in some parts of the state, even where elk populations are not declining, by changing the behavior and habitat use of elk during the hunting season. As observed elsewhere (Creel and Winnie 2005, Mao et al. 2005), Idaho's elk may now be spending more time in forested areas, on steeper slopes, and at higher elevations than before wolf reintroductions, making it more difficult for hunters to find animals. Changes in herding behavior and movement rates (Proffitt et al. 2009) may also affect hunting success. Wolves are believed to be a main factor in the recent decline of moose in the Lolo zone, but their impact on moose abundance in other parts of Idaho is not well known (J.

Rachael, pers. comm.). Moose populations in some areas may be more directly affected by habitat changes, harvest levels, or other causes (S. Nadeau, pers. comm.). The impact of wolves on deer and other ungulates in the state appears negligible (J. Rachael, pers. comm.; S. Nadeau, pers. comm.).

Big game revenue and tag sales to resident and non-resident hunters have remained stable in recent years for the Idaho Department of Fish and Game (B. Compton, pers. comm.; S. Nadeau, pers. comm.). Some hunters have indicated that they would not return to their hunting areas because of real or perceived impacts of wolves, but whether this has produced significant changes in hunter activity has been difficult to assess. Hound hunting permit sales have also remained level or slightly increased in the state (S. Nadeau, pers. comm.).

In Wyoming, at present, there are no definitive data showing decreased hunter harvest or opportunity due to wolf predation on elk or moose (WGFC 2008).

Mexican gray wolves were reintroduced to a portion of western New Mexico and eastern Arizona beginning in 1998 and numbered 44-50 animals by 2004 and 2005. Unsworth et al. (2005) reported that this level of abundance caused no measurable changes in elk harvest or outfitter income between 1998 and 2004, and that numbers of elk and deer hunters and hunter days to the area actually increased. Elk and deer populations declined in the area during this period, but this was likely due to changes in forage conditions and game management decisions rather than predation by wolves.

In the Great Lakes states, where about 4,000 wolves occur, white-tailed deer populations are thriving and continue to be managed at relatively high densities with numbers often above local management goals (DelGiudice et al. 2009). Annual hunter harvest has remained high, averaging 96,000 deer in Minnesota, 148,000 deer in Wisconsin, and 73,300 deer in Michigan. Wolves have been estimated to reduce the pre-harvest deer populations in Minnesota, Wisconsin, and Michigan by <15%, <1.8%, and about 1.3%, respectively (DelGiudice et al. 2009). Mech and Nelson (2000) concluded that wolf predation did not influence hunter harvest of deer in most areas of Minnesota, but did exert a negative impact in locations with low deer densities.

## Summary

The possible impacts of wolf predation on ungulate populations are debated by both the general public and the scientific community (see Chapter 5, Section A). Big game hunters in Washington are concerned that wolves will cause declining ungulate populations and opportunities for hunting. As described in Chapter 5, many factors affect the population sizes and trends of elk, deer, and other big game species, including habitat quantity and quality, severe weather, levels of hunter harvest, predation, and disease. These factors vary locally, further complicating efforts to determine the effects of wolf predation on ungulate populations and hunter success. Predicting wolf-related impacts that may occur in Washington in the future is especially difficult because of the many uncertainties involving where and how rapidly wolves become reestablished, their eventual abundance and diet composition, prey species behavior and population changes, hunter responses, and other influences.

Despite these limitations, this plan offers some general approximations of wolf predation levels on ungulates that might occur in Washington (see Chapter 5, Section E). Total populations of 50 and

100 wolves are expected to have minor overall impacts on ungulate populations. Fifty wolves may kill about 425-630 elk and 700-1,050 deer per year, with annual take doubling for 100 wolves (see Table 13 for an explanation of these estimates). These levels of predation could result in noticeable effects on elk and deer abundance in some localized areas occupied by wolf packs, but should not have broad-scale impacts. These levels of loss potentially represent 1-2% of the state's elk population and less than 1% of the combined deer population. With larger populations of wolves, greater numbers of ungulates would be removed annually, with perhaps 1,700-3,800 elk and 2,800-6,300 deer taken if 200-300 wolves became reestablished (Table 13). Predation levels on moose are also difficult to estimate, but may be significant if wolves become numerous in northeastern Washington. Wolf take of bighorn sheep and mountain goats is expected to be minor.

Populations of 50 to 100 wolves should have few negative effects on big game hunting in Washington, as demonstrated by the relatively small estimated take of ungulates noted above. As in the Yellowstone region (Creel and Winnie 2005, Mao et al. 2005, Proffitt et al. 2009), wolves may also cause some redistribution of game, which could make these species somewhat less vulnerable to harvest. However, these impacts together would be restricted to the relatively few areas occupied by packs during the initial recovery stages and would probably not reduce statewide harvests of elk and deer by more than 1-3%. If these outcomes discouraged a similar proportion of hunters from hunting, then big game-related hunting expenditures in the state, including the revenues generated by WDFW, could decrease by a comparable amount (about \$100,000 to 300,000 annually). Whether or not the loss of a small percent of the state's elk and deer would affect hunter participation and by how much is unknown. Some outfitters catering to hunters would perhaps be negatively affected, but because this industry is small in Washington, the overall financial impact would be small. If some non-resident hunters decided not to hunt in Washington, this effect would be negligible because non-resident elk and deer hunters comprise a small fraction of total hunters in the state (Figure 28). If cougar hunting with hounds resumes in the future, losses of hounds to wolves are not expected to exceed one or two animals per year, as noted in Idaho and Montana (S. Nadeau, pers. comm.; C. Sime, pers. comm.), where much larger wolf populations exist.

Larger wolf populations would be expected to have greater impacts on game and hunting opportunity, but such impacts become increasingly difficult to predict or measure. To accommodate larger elk and deer losses from wolves, reductions in antlerless take and perhaps other restrictions such as shortened hunting seasons or reduced availability of special permits may be needed in some areas where wolves become common. Given the stable or increasing numbers of hunters, tag sales, numbers of animals killed, levels of hunter success, and amount of revenue generated in association with elk and deer hunting in Washington during the past decade (Figures 19, 21, 29), there appears to be some capacity for the state to accommodate the game losses caused by wolves.

In the future, there could be revenue generated for WDFW if wolves recover to the point that they are delisted, reclassified as a game species, and eventually become hunted. Revenue could be generated through special permit application sales, auctions, and raffles. It is unknown how much revenue would be generated from these sources. Such sales might be similar to those obtained for bighorn sheep, moose, and mountain goats during most of the past decade (Figure 30), an estimated \$50,000 to \$150,000 per year, or could be higher. The one-year hunting seasons for wolves in Idaho and Montana in 2009-2010 generated about \$450,000 (31,400 licenses sold) and \$326,000 (15,603 licenses sold), respectively, in revenue (USFWS et al. 2010, IDFG 2011). Revenue in Washington

would depend on the number of wolf licenses sold, cost per license, number of wolves allowed to be taken, and the geographic extent of the season. This analysis would be developed in a post-delisting management plan.

The presence of wolves may provide an additional benefit for some hunters by enhancing their overall hunting experience. The possibility of seeing or hearing wolves, finding wolf tracks or a wolf kill, or hunting among wolves could give considerable enjoyment to these hunters.

#### **D. Wildlife Tourism**

Ecotourism, or travel to natural areas for environmentally responsible outdoor experiences, is one of the fastest growing segments of the overall world tourism industry. Wildlife viewing is a large part of this business and is hugely popular in the United States.

According to the 2006 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation, more than 71 million Americans 16 years old and older (31% of the U.S residents in this age bracket) participated in wildlife watching activities (i.e., observing, feeding, photographing, etc.; includes fish viewing) in 2006 (USFWS and USCB 2007). Of these, almost 23 million people took trips more than one mile from their homes specifically to see wildlife. Participation in wildlife viewing increased 8% nationally from 2001 to 2006, in contrast to fishing and hunting, which fell 12% and 4%, respectively. Wildlife watchers spent nearly \$46 billion in 2006, or about \$650 per participant, with trip-related expenditures increasing 38% between 2001 and 2006. Seventy percent (16.2 million people) of the wildlife watchers traveling away from home observed, fed, or photographed land mammals, with 56% (12.8 million people) specifically interested in large mammals such as deer, bears, and coyotes. Eighty-three percent of wildlife watchers traveling away from home did so in their home state; 33% visited other states.

In Washington during 2006, an estimated 2.33 million people 16 years old and older participated in some form of wildlife watching, which ranked the state 11th in the nation for participation (USFWS and USCB 2007, 2008). About 2.00 million participants were state residents (40% of the state's total population in this age group), with the remainder being non-residents. An estimated 628,000 residents and 331,000 non-residents in this age group traveled more than one mile away from home to view wildlife in Washington during the year. Residents spent an estimated 8.0 million days (88% of the total; average of 12.7 days per person) and non-residents spent an estimated 1.1 million days (12%; average of 3.4 days per person) watching wildlife away from home in the state during the year. Washington residents spent an additional 1.48 million days watching wildlife in other states in 2006. Overall, wildlife watchers outnumbered hunters and anglers combined by nearly three times in Washington.

Annual spending in Washington by resident and non-resident wildlife watchers on travel, food, lodging, equipment, and other goods and services totaled an estimated \$1.5 billion in 2006, ranking the state seventh in the nation behind California, Florida, Texas, Michigan, Georgia, and New York (USFWS and USCB 2007, 2008). About \$595 million was spent during the year on equipment, \$442 million on trip-related costs, and \$466 million on other costs (Table 22). Annual spending by wildlife watchers in the state rose 53% from 2001 to 2006 (USFWS and USCB 2003, 2007, 2008). Participants spent an average of \$645 per person in 2006 (Table 22). Overall, wildlife watchers outspent hunters and anglers combined by 5% (\$1.43 billion vs. \$1.36 billion) in Washington

(USFWS and USCB 2008). Wildlife viewing generated an estimated 22,439 jobs in Washington in 2001 (USFWS 2003). However, revenue to WDFW for wildlife conservation and management generated by wildlife watchers is minimal.

#### Wolf-Related Tourism in North America

Commercial wolf watching has grown in significance in North America over the past several decades, especially in the lower 48 states, and has resulted in regional economic benefits. Yellowstone National Park has become the premier wolf viewing location on the continent, with a thriving and rapidly growing wolf-watching business since the species was reintroduced in 1995 and 1996. Visitor surveys in 2005 showed that the opportunity to see or hear wolves increased annual rates of park visitation by almost 4% and spending on lodging, food, and other services by an estimated \$35.5 million among people coming from outside Wyoming, Montana, and Idaho (Duffield et al. 2006, 2008). Wolves have joined grizzly bears as the marquee species most sought after at Yellowstone, with about 44% of visitors hoping to see wolves (Duffield et al. 2008). Many wolf-watchers at the park are repeat visitors. Even visitors who fail to see wolves are often satisfied with their experiences through hearing wolves, seeing their tracks and scat, or simply knowing that wolves were nearby (Montag et al. 2005). Duffield et al. (2008) estimated that more than 300,000 visitors saw wolves at the park in 2005 alone.

National Park Service officials had originally expected Yellowstone's wolves to be far more secretive and less visible, as at Isle Royale (Michigan) and Denali (Alaska) National Parks, and therefore did not anticipate these levels of recreational and economic impacts. However, the park's wolves

Table 22. Estimated total expenditures and average expenditures per participant for all types of wildlife-watching activities in Washington in 2006, including both those around the home and away from home (from USFWS and USCB 2007, 2008). Estimates are for state residents and non-residents combined.

Category of expenditure	Total amount	Average amount per participant <sup>a</sup>
Food and lodging	\$227,721,000	\$98
Transportation	157,045,000	67
Other trip costs (boating costs, guide/outfitter fees, public and private land use fees, equipment rental, other)	56,886,000	24
Total trip related	441,652,000	189
Wildlife-watching equipment (wildlife feed, cameras, binoculars, hiking equipment, other)	262,335,000	113
Auxiliary equipment (camping equipment, other)	29,797,000	13
Special equipment (off-road vehicles, campers, boats, other)	302,574,000	130
Total equipment	594,706,000	255
Other items (land leasing and ownership, plantings around homes that benefit wildlife, membership dues, contributions, literature, other)	465,953,000	200
Total expenditures	\$1,502,311,000	\$645

<sup>a</sup> Based on an estimated total of 2,331,000 wildlife-watching participants in Washington.

quickly became accustomed to roads, traffic, and people, and readily occupied more open terrain. The local tourism industry and business community seized the opportunity by offering guided trips to find wolves. Guides explain wolf behavior and biology, and increase the likelihood of visitors seeing wolves. More than 50 organizations now offer wolf trips (Kirkwood 2006) and at least one tour company advertises a 97% success rate in seeing animals. Wolves are more easily observed from fall through spring and therefore help attract visitors to the region during the months of lowest visitation. Most wolf watching in the greater Yellowstone area remains within the national park itself. Outfitters and guides in outlying areas, where wolves are also thriving on both public and private lands, haven't been as successful in organizing as many wolf-watching trips.

In other parts of North America, wolf-related tourism has expanded in different ways:

- The International Wolf Center in Ely, Minnesota, brings about \$3 million per year to the area and creates as many as 66 jobs in tourism-related businesses and other industries (Schaller 1996). The center, which specializes in wolf education and tourism, opened in 1993 on the edge of the Boundary Waters Canoe Area Wilderness in the heart of the largest wolf population in the lower 48 states. A 2004 survey showed that a third of all tourists to northeastern Minnesota visited the center, resulting in a major economic benefit for the surrounding two-county area. Visitation totaled 42,000 people in 2005.
- After red wolves were reintroduced to northeastern North Carolina in 1987 and grew to an estimated population of 100 by 2005, a study found interest in developing a fledgling wolf tourism business (Lash and Black 2005). Weekly wolf howling tours at the Alligator River National Wildlife Refuge drew about 900 visitors from across the country in 2005. A planned Red Wolf Visitor and Education Center, partnered with existing nature tourism activities (e.g., hiking, fishing, other wildlife viewing) in the Outer Banks region is estimated to potentially attract over 25,000 households annually, boost tourism by up to 19%, and bring in about \$37.5 million in direct and indirect tourist spending to North Carolina (Lash and Black 2005).
- Wolf howling expeditions in Algonquin Provincial Park in Ontario, Canada, where dense forest cover makes wolves more likely to be heard than seen, have drawn more than 2,000 participants every summer since 1963, contributing almost \$1.9 million to Ontario's yearly economy (Bowman and Eagle 2004).
- The 1998 reintroduction of Mexican gray wolves to eastern Arizona and western New Mexico, including the Gila and Apache National Forests, has triggered wolf-related tours by the Arizona Heritage Alliance, Grand Canyon Chapter of the Sierra Club, and other private parties (Unsworth et al. 2005). The lack of comprehensive annual visitation estimates for the area's national forests prior to the arrival of wolves makes it impossible to measure wolf-related increases in tourist numbers and expenditures.
- Wolf-related tourism has the potential to succeed in central Idaho (Druzin 2007), but remains in the very early stages of development. Hunting outfitters have teamed up with environmental interpreters to give visitors glimpses of wolves in the Frank Church River of No Return Wilderness and the Sawtooth National Recreation Area. One outfitter (M. Branson, Wind River Outfitters) who guides hunters north of the Salmon River in the

Wilderness believes that wolves have made it harder to hunt elk, but that their presence adds to the mystique of the Idaho wilderness that his customers are willing to pay for (Barker 2008). According to this outfitter, some hunters find wolf encounters to be the high point of their trips. Wolves have also made this company's summer pack trips more popular.

- Several private landowners have shown recent interest in developing small-scale wolf watching at locations in western Montana away from Yellowstone and Glacier National Parks (C. Sime, pers. comm.). In these cases, landowners have the potential to attract high paying clients by offering opportunities to see wolves and enjoy the outdoors away from the more crowded conditions of the national parks. If successful, these enterprises would broaden the economic benefits of viewing wolves to a larger geographic portion of the state.

### Summary

As with the other economic outcomes discussed in this chapter, Washington's ability to develop a viable wolf-related tourism industry will depend on where and how many wolves eventually become reestablished in the state, their behavior, and human behavior in response to them. However, Washington appears to have potential for receiving at least modest economic benefits from wolf watching for the following reasons:

- 1) Wildlife watching is already a highly popular activity among Washington's residents and visitors, as shown by the number of participants and money generated (USFWS and USCB 2007, 2008). As a result, the state has one of the larger wildlife-watching constituencies in the nation. Specific interest in viewing wolves is demonstrated by a 2008 telephone survey of 805 Washington residents 18 years old and older that found that 54% of respondents would travel to see or hear wild wolves in the state (Duda et al. 2008a).
- 2) As noted in locations such as Yellowstone National Park, wolves undoubtedly would be highly popular among wildlife watchers in Washington, providing that animals can be seen or heard, or that other evidence (tracks, scat) of their presence can be encountered on a fairly reliable basis.
- 3) Large population centers in the greater Seattle, Portland, Vancouver, B.C., and Spokane areas provide nearby sources of tourists. Each is within several driving hours of at least one area where wolf recovery is expected to occur (i.e., the northern Cascades, southern Cascades, northeastern Washington, and the Blue Mountains) and within a day's driving distance of the entire state. Depending on the quality of viewing, visitors from outside the Pacific Northwest will also likely come to Washington to see wolves.
- 4) Washington includes large amounts of public land administered primarily by the U.S. Forest Service, National Park Service, and other federal and state agencies. Not only are these lands conducive to wolf recovery, but as seen elsewhere in North America, public land ownership lends itself to wolf-related tourism much better than private land ownership.
- 5) Outfitting and guiding businesses in Washington already include wildlife-viewing recreational activities that provide the infrastructure needed to expand into commercial wolf viewing and listening.

- 6) Washington offers many high quality outdoor activities (e.g., fishing, hunting, hiking, camping, river running, viewing of other wildlife, and visiting national parks, national forests, and federal and state wildlife areas) in a scenic setting that would be complementary to wolf watching and help attract visitors to areas supporting wolves.

Although difficult to estimate, the experiences of Minnesota and Ontario (where money values have been calculated) suggest that Washington could reasonably expect to derive economic benefits of perhaps several million dollars annually from wolf-related activities by the time the species could be delisted. Larger wolf populations in the state would likely expand viewing opportunities and economic benefits. Depending on the extent to which communities and wildlife-viewing guiding businesses use these opportunities, Washington could conceivably develop a sizable wolf-related tourist industry.

The economic gain from wolf tourism has the potential to offset or exceed the combined costs of livestock depredation and reduced hunting opportunities. Monies generated by wolf watching would largely go to the counties where wolf recovery is most likely to occur, such as those in northeastern and southeastern Washington and those along the Cascades. This would benefit many of the more rural counties among these that have lower median household incomes and higher unemployment than elsewhere in the state (see OFM 2007b, WSDOT 2008).

To achieve this potential, Washington will need to have some areas where wolves are safe from harassment, and are therefore less afraid of people and more likely to use open terrain. The state has at least two locations that could potentially offer good wolf viewing. Mt. St. Helens National Volcanic Monument features a large open volcanic plain created by the 1980 eruption of Mt. St. Helens. The plain and its sizable elk herd are easily viewed from various places along Johnson Ridge (including the Forest Service's Johnson Ridge Observatory) and elsewhere. The Methow Valley in Okanogan County supports large wintering deer herds in open habitats on both public and private lands, and could attract wolves at that time of the year. Both of these locations are already popular tourist destinations, so it may be difficult to quantify the economic benefits derived solely from wolf viewing.

Wolf-based tourism also has some potential in other areas of the state (e.g., some national forest lands) where wolves are not frequently seen, but are regularly present and relatively safe from harassment. Modest numbers of visitors without high expectations might still be attracted to such areas in hopes of possibly seeing or hearing a wolf or finding wolf sign. Wolf tourism in such locations could be developed in various innovative ways, such as through the use of remote cameras and websites, tracking and howling trips, or even development of a wolf visitor center similar to that in Minnesota, where deeply wooded terrain also makes wolves difficult to see.

Offsetting these projected benefits to tourism, wolf presence may possibly scare some visitors away from visiting national forests and other wildland areas through fears over personal safety. However, this problem has not been reported in other localities with wolves in the lower 48 states. Additionally, any substantial wolf-related declines in the viewability of elk, deer, and other ungulates, caused either by changes in behavior or population declines, could possibly lower the viewing opportunities for these species in some localized areas. The extent of lost revenues from this impact is difficult to project.

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## **E. Forest Products Industry**

### Overview of the Forest Products Industry in Washington

The total value of Washington's forest products industry (including lumber, wood products, paper, and wood-related manufacturing production) was \$15.9 billion in 2006 (WFPA 2007), which represented an estimated 5.4% of the state's economic output. Washington is the second largest producer of softwood lumber in the nation, accounting for 13% of total U.S. production.

More than half (52%, 22.1 million acres) of Washington is forested (WFPA 2007). Sixty-four percent (14.3 million acres) of the state's forestlands are managed by federal, state, tribal, county, and municipal concerns, with the U.S. Forest Service being by far the largest holder (58%, 8.2 million acres) among these. The rest (36%, 7.9 million acres) are privately owned, of which 59% (4.6 million acres) are considered industrial forestlands. In total, 73% (16.2 million acres) of the state's forests are used commercially. From 2000 to 2005, 71% of the timber harvested in Washington came from private forestland, whereas just 2% originated from federal land (WFPA 2007). About 7 billion board feet of lumber were harvested annually in the late 1980s, but this figure has declined to about 4 billion board feet since the mid-1990s due to federal and state policy changes. Based on timber tax revenues, the 15 largest timber-producing counties in the state in 2006 were (in order) Lewis, Grays Harbor, Pacific, Cowlitz, Clallam, Pierce, Stevens, Mason, Jefferson, Thurston, Klickitat, Skagit, King, Snohomish, and Clark counties (WSDOR 2007). Thirteen of these counties are located in western Washington.

### Summary

Wolves are habitat generalists, but in the western United States occur most frequently in forests (USFWS 2009). Wolves are also fairly tolerant of moderate amounts of human disturbance, even in the vicinity of active wolf dens (Thiel et al. 1998, Frame et al. 2007). Hence, restrictions on land use practices have not been necessary to achieve wolf conservation in Idaho, Montana, and Wyoming (USFWS 2009). For these reasons, wolf reestablishment in Washington is not expected to result in the imposition of any land use restrictions to protect and conserve wolves other than those that occasionally may be needed to temporarily protect den sites from malicious or careless destruction during the denning period (see Chapter 8).

In neighboring states with wolves, no restrictions have been placed on the forest products industry regarding timber management and logging to protect wolves. On private forestlands in Washington, no restrictions are anticipated with the possible exception of delaying timber harvests near occupied den sites until after the completion of the denning season. The Washington Department of Natural Resources currently has a provision under the Washington State Forest Practices Act Critical Habitats Rule for threatened and endangered species (WAC 222-16-080) for gray wolves. Forest practices on state and private land where harvesting, road construction, or site preparation is proposed within 1 mile of a known active wolf den, documented by WDFW, between the dates of March 15 and July 30, or 0.25 mile from the den at other times of the year, are designated as a Class IV-Special and require an extra 14 days of review, and are subject to State Environmental Policy Act (SEPA) review. The rule was established in 1992, but much has been learned since then about habitat issues involving wolves in neighboring states. This newer information suggests that the rule should be reviewed and perhaps modified to reflect current knowledge.

1 On public forestlands, WDFW has no legal authority to implement timber harvest and other land  
2 use restrictions on land it does not manage; land management agencies can and may adopt seasonal  
3 or area restrictions independently from WDFW. However, experience in Idaho, Montana, and  
4 Wyoming has shown that no restrictions, other than those occasionally needed to temporarily  
5 prevent excessive disturbance of occupied den sites, have been necessary to conserve wolves.  
6

7 In summary, wolf reestablishment in Washington is anticipated to have no economic impact on the  
8 state's forest products industry.  
9

#### 10 **F. Other Potential Economic Impacts**

11  
12 In addition to concerns over potential hunting-related impacts, commercial outfitters in Washington  
13 have expressed concern that agency-dictated area closures related to wolf presence (especially during  
14 the denning period) may preclude access to or through some desirable areas on federal and state  
15 lands (G. Ulin, pers. comm.). They have expressed concerns that even temporary closures under  
16 this scenario could result in significant financial impacts to affected outfitters. As described  
17 elsewhere in this plan (Chapter 8; Chapter 14, Section E), very few area closures of this type have  
18 occurred in Idaho, Montana, or Wyoming, and few, if any, are expected in Washington. However,  
19 WDFW has no legal authority over land it does not manage; land management agencies can and may  
20 adopt seasonal or area restrictions independently from WDFW. Thus, there is minor potential for  
21 wolf-related area closures to occur in the state. However, if this should occur, it would be of a  
22 temporary nature and the number of areas affected would likely be very small, hence few outfitting  
23 companies are expected to be impacted.

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## 15. LITERATURE CITED

- Adamire, B. 1985. Wolf bounties paid by the Clallam County auditor's office, 1906-1929. Unpublished records from Clallam County, Port Angeles.
- Adams, J. R., L. M. Vucetich, P. W. Hedrick, R. O. Peterson, and J. A. Vucetich. 2011. Genomic sweep and potential genetic rescue during limited environmental conditions in an isolated wolf population. *Proceedings of the Royal Society B* doi:10.1098/rspb.2011.0261.
- Adams, L. G., B. W. Dale, and L. D. Mech. 1996. Wolf predation of caribou calves in Denali National Park, Alaska. Pages 245-260 in L. N. Carbyn, S. H. Fritts, and D. R. Seip, eds. *Ecology and conservation of wolves in a changing world*. Canadian Circumpolar Institute, University of Alberta, Edmonton, Alberta.
- Adams, L. G., R. O. Stephenson, B. W. Dale, R. T. Ahgook, and D. J. Demma. 2008. Population dynamics and harvest characteristics of wolves in the Central Brooks Range, Alaska. *Wildlife Monographs* 170:1-25.
- Akcakaya, H. R. 2002. RAMAS GIS: linking spatial data with population viability analysis (version 4.0). Applied Biomathematics, Setauket, New York.
- Akenson, J., H. Akenson, and H. Quigley. 2005. Effects of wolf introduction on a cougar population in the central Idaho wilderness. *Mountain Lion Workshop* 8:177-187.
- Almack, J. A. and S. H. Fitkin. 1998. Grizzly bear and gray wolf investigations in Washington State, 1994-1995. Washington Department of Fish and Wildlife, Olympia, Washington.
- Almberg, E. S., L. D. Mech, D. W. Smith, J. W. Sheldon, and R. L. Crabtree. 2009. A serological survey of infectious disease in Yellowstone National Park's canid community. *PLoS ONE* 4:e7042.
- Anonymous. 1990. Two gray wolf pack discovered in northern Washington. *Endangered Species Technical Bulletin* 15(6):6.
- Anthony, R. G., J. A. Estes, M. A. Ricca, A. K. Miles, and E. D. Forsman. 2008. Bald eagles and sea otters in the Aleutian Archipelago: indirect effects of trophic cascades. *Ecology* 89:2725-2735.
- Arjo, W. M. and D. H. Pletscher. 1999. Behavioral responses of coyotes to wolf recolonization in northwestern Montana. *Canadian Journal of Zoology* 77:1919-1927.
- Arjo, W. M., D. H. Pletscher, and R. R. Ream. 2002. Dietary overlap between wolves and coyotes in northwestern Montana. *Journal of Mammalogy* 83:754-766.
- Asa, C., P. Miller, M. Agnew, J. A. R. Rebolledo, S. L. Lindsey, M. Callahan, and K. Bauman. 2007. Relationship of inbreeding with sperm quality and reproductive success in Mexican gray wolves. *Animal Conservation* 10:326-331.
- Aspi, J., E. Roininen, M. Ruokonen, I. Kojola, and C. Vila. 2006. Genetic diversity, population structure, effective population size and demographic history of the Finnish wolf population. *Molecular Ecology* 15:1561-1576.
- Atwood, T. C. and E. M. Gese. 2010. Importance of resource selection and social behavior to partitioning of hostile space by sympatric canids. *Journal of Mammalogy* 91:490-499.
- Atwood, T. C., E. M. Gese, and K. E. Kunkel. 2007. Comparative patterns of predation by cougars and recolonizing wolves in Montana's Madison Range. *Journal of Wildlife Management* 71:1098-1106.
- Ausband, D. E. 2010. Pilot study report for using biofence to manipulate wolf pack movements in central Idaho. Available online at:  
<<http://www.umt.edu/mcwru/personnel/ausband/default.aspx>>

- 
- 1 Ausband, D. E., J. Holyan, and C. Mack. 2009a. Longevity and adaptability of a reintroduced gray  
2 wolf. *Northwestern Naturalist* 90:44-47.
- 3 Ausband, D.E., M. S. Mitchell, K. Doherty, P. Zager, C. M. Mack, and J. Holyan. 2010. Surveying  
4 predicted rendezvous sites to monitor gray wolf populations. *Journal of Wildlife Management*  
5 74:1043-1049.
- 6 Ausband, D., M. Mitchell, A. Mynsberge, C. Mack, J. Stenglein, and L. Waits. 2009b. Developing  
7 wolf population monitoring techniques. University of Montana, the Nez Perce Tribe,  
8 University of Idaho, Idaho Department of Fish and Game, Montana Fish, Wildlife and Parks,  
9 and U.S. Fish and Wildlife Service.
- 10 Backus, P. 2008. State set to take over wolf kill payments. *Missoulian* 2008(February 19).
- 11 Ballard, J. 2009. Elk hunting forecast. Rocky Mountain Elk Foundation, Missoula, Montana.  
12 <<http://www.rmef.org/Hunting/Features/Articles/2009Forecast.htm>>
- 13 Ballard, W. B., J. S. Whitman, and D. J. Reed. 1990. Population dynamics of moose in south-central  
14 Alaska. *Wildlife Monographs* 114:1-49.
- 15 Ballard, W. B., L. N. Carbyn, and D. W. Smith. 2003. Wolf interactions with non-prey. Pages 259-  
16 271 in L. D. Mech and L. Boitani, editors. *Wolves: behavior, ecology, and conservation*.  
17 University of Chicago Press, Chicago, Illinois.
- 18 Bangs, E. E. and J. Shivik. 2001. Managing wolf conflict with livestock in the northwestern United  
19 States. *Carnivore Damage Prevention News* No. 3(July):2-5.
- 20 Bangs, E. E., T. N. Bailey, and M. F. Portner. 1989. Survival rates of adult female moose on the  
21 Kenai Peninsula, Alaska. *Journal of Wildlife Management*. 53:557-563.
- 22 Bangs, E. E., J. A. Fontaine, M. D. Jimenez, T. J. Meier, E. H. Bradley, C. C. Niemeyer, D. W.  
23 Smith, C. M. Mack, V. Asher, and J. K. Oakleaf. 2005b. Managing wolf/human conflict in the  
24 northwestern United States. Pages 340-356 in R. Woodroffe, S. Thirgood, and A. Rabinowitz,  
25 editors. *People and wildlife: coexistence or conflict?* Cambridge University Press, Cambridge,  
26 United Kingdom.
- 27 Bangs, E., J. Fontaine, T. Meier, C. Niemeyer, M. Jimenez, D. Smith, C. Mack, V. Asher, L.  
28 Handegard, M. Collinge, R. Krischke, C. Sime, S. Nadeau, and D. Moody. 2004. Restoration  
29 and conflict management of the gray wolf in Montana, Idaho, and Wyoming. *Transactions of*  
30 *the North American Wildlife and National Resources Conference* 69:89-105.
- 31 Bangs, E. E., S. H. Fritts, J. A. Fontaine, D. W. Smith, K. M. Murphy, C. M. Mack, and C. C.  
32 Niemeyer. 1998. Status of gray wolf restoration in Montana, Idaho, and Wyoming. *Wildlife*  
33 *Society Bulletin* 26:785-798.
- 34 Bangs, E., M. Jimenez, C. Niemeyer, J. Fontaine, M. Collinge, R. Krischke, L. Handegard, J. Shivik,  
35 C. Sime, S. Nadeau, C. Mack, D. Smith, V. Asher, and S. Stone. 2006. Non-lethal and lethal  
36 tools to manage wolf-livestock conflict in the northwestern United States. *Proceedings of the*  
37 *Vertebrate Pest Conference* 22:7-16.
- 38 Bangs, E., M. Jimenez, C. Niemeyer, T. Meier, V. Asher, J. Fontaine, M. Collinge, L. Handegard, R.  
39 Krischke, D. Smith, and C. Mack. 2005a. Livestock guarding dogs and wolves in the northern  
40 Rocky Mountains of the United States. *Carnivore Damage Prevention News* 8:32-39.
- 41 Barber-Meyer, S. M., L. D. Mech, and P. J. White. 2008. Elk calf survival and mortality following  
42 wolf restoration to Yellowstone National Park. *Wildlife Monographs* 169:1-30.
- 43 Barber-Meyer, S. M., P. J. White, and L. D. Mech. 2007. Survey of selected pathogens and blood  
44 parameters of northern Yellowstone elk: wolf sanitation effect implications. *American Midland*  
45 *Naturalist* 158:369-381.
- 46 Barker, R. 2008. 13 years on, wolves have changed friends and foes alike. *Idaho Statesman*  
47 2008(January 27).
-

- Barnowe-Meyer, K. K., P. J. White, T. L. Davis, D. W. Smith, R. L. Crabtree, and J. A. Byers. 2010. Influence of wolves and high-elevation dispersion on reproductive success of pronghorn (*Antilocapra americana*). *Journal of Mammalogy* 91:712-721.
- BCMELP (British Columbia Ministry of Environment, Lands, and Parks). 1988. Wolf: wildlife distribution mapping, big game series. [Map]. Integrated Management Branch, Wildlife Branch, British Columbia Ministry of Environment, Lands, and Parks, Victoria, British Columbia.
- Becker, S. A. 2008. Habitat selection, condition, and survival of Shiras moose in northwest Wyoming. M.S. thesis, University of Wyoming, Laramie, Wyoming.
- Beebe, L. no date. Wilderness trails and a dream: the story behind the Olympic Game Farm. Olympic Graphic Arts, Forks, Washington.
- Beier, P. 1991. Cougar attacks on humans in the United States and Canada. *Wildlife Society Bulletin* 19: 403-412.
- Bensch, S., H. Andrén, B. Hansson, H. C. Pedersen, H. Sand, D. Sejberg, P. Wabakken, M. Åkesson, and O. Liberg. 2006. Selection for heterozygosity gives hope to a wild population of inbred wolves. *PLoS ONE* 1(1): e72.
- Berger, J. and D. W. Smith. 2005. Restoring functionality in Yellowstone with recovering carnivores: gains and uncertainties. Pages 100-109 in J. C. Ray, K. H. Redford, R. S. Steneck, and J. Berger, editors. *Large carnivores and the conservation of biodiversity*. Island Press, Washington, D.C.
- Berger, J., P. B. Stacey, L. Bellis, and M. P. Johnson. 2001. A mammalian predator-prey imbalance: grizzly bear and wolf extinction affect avian neotropical migrants. *Ecological Applications* 11:947-960.
- Berger, K. M. and M. M. Conner. 2008. Recolonizing wolves and mesopredator suppression of coyotes: impacts on pronghorn population dynamics. *Ecological Applications* 18:599-612.
- Berger, K. M. and E. M. Gese. 2007. Does interference competition with wolves limit the distribution and abundance of coyotes? *Journal of Animal Ecology* 76:1075-1085.
- Berger, K. M., E. M. Gese, and J. Berger. 2008. Indirect effects and traditional trophic cascades: a test involving wolves, coyotes, and pronghorn. *Ecology* 89:818-828.
- Bergerud, A. T. and J. B. Snider. 1988. Predation in the dynamics of moose populations: a reply. *Journal of Wildlife Management* 52:559-564.
- Bernatowicz, J. A. 2010. Deer status and trend report: Region 3. Pages 34-36 in Washington Department of Fish and Wildlife. 2010 game status and trend report. Washington Department of Fish and Wildlife, Olympia, Washington. 279 pp.
- Bernatowicz, J. A. and M. Livingston. 2010. Elk status and trend report: Region 3. Pages 78-82 in Washington Department of Fish and Wildlife. 2010 game status and trend report. Washington Department of Fish and Wildlife, Olympia, Washington. 279 pp.
- Beschta, R. L. 2005. Reduced cottonwood recruitment following extirpation of wolves in Yellowstone's Northern Range. *Ecology* 86:391-403.
- Beschta, R. L. and W. J. Ripple. 2008. Wolves, trophic cascades, and rivers in the Olympic National Park, USA. *Ecohydrology* 1:118-130.
- Beschta, R. L. and W. J. Ripple. 2009. Large predators and trophic cascades in terrestrial ecosystems of the western United States. *Biological Conservation* 142:2401-2414.
- Beschta, R. L. and W. J. Ripple. 2010. Recovering riparian communities with wolves in northern Yellowstone, U.S.A. *Restoration Ecology* 18:380-389.
- Beyer, D. E., Jr., R. O. Peterson, J. A. Vucetich, and J. H. Hammill. 2009. Wolf population changes in Michigan. Pages 65-85 in A. P. Wydeven, T. R. Van Deelen, and E. J. Heske, editors. *Recovery of gray wolves in the Great Lakes region of the United States: an endangered species success story*. Springer, New York, New York.

- 
- 1 Blackfeet Tribal Business Council. 2008. Blackfeet Tribe wolf management plan. Blackfeet Tribal  
2 Business Council, Browning, Montana. <[http://www.fws.gov/mountain-](http://www.fws.gov/mountain-prairie/species/mammals/wolf/)  
3 [prairie/species/mammals/wolf/](http://www.fws.gov/mountain-prairie/species/mammals/wolf/)>
- 4 Boertje, R. D., M. A. Keech, D. D. Young, K. A. Kellie, and C. T. Seaton. 2009. Managing for  
5 elevated yield of moose in interior Alaska. *Journal of Wildlife Management* 73:314-327.
- 6 Boertje, R. D., P. Valkenburg, and M. E. McNay. 1996. Increases in moose, caribou, and wolves  
7 following wolf control in Alaska. *Journal of Wildlife Management* 60:474-489.
- 8 Boitani, L. 2003. Wolf conservation and recovery. Pages 317-340 in L. D. Mech and L. Boitani,  
9 editors. *Wolves: behavior, ecology, and conservation*. University of Chicago Press, Chicago,  
10 Illinois.
- 11 Boitani, L., P. Cucci, and E. Raganella-Pelliccioni. 2010. Ex-post compensation payments for wolf  
12 predation on livestock in Italy: a tool for conservation? *Wildlife Research* 37:722-730.
- 13 Booth, E. S. 1947. Systematic review of the land mammals of Washington. Ph.D. thesis, State  
14 College of Washington, Pullman, Washington.
- 15 Boutin, S. 1992. Predation and moose population dynamics: a critique. *Journal of Wildlife*  
16 *Management* 56:116-127.
- 17 Bowman, M. E. and P. F. G. Eagles. 2004. Tourism spending in Algonquin Provincial Park. In N.  
18 W. P. Munro, P. Deardon, T. B. Herman, K. Beazley, and S. Bondrup-Nielsen, editors. *Making*  
19 *ecosystem based management work: connecting managers and researchers*. Proceedings of the  
20 Fifth International Conference on Science and Management of Protected Areas, Science and  
21 Management of Protected Areas Association, Wolfville, Nova Scotia.  
22 <[http://www.sampaa.org/publications/conference-proceedings-1991-2000/2003-](http://www.sampaa.org/publications/conference-proceedings-1991-2000/2003-proceedings/economic-analysis-protected-areas/Bowman%20and%20Eagles%202004.pdf/view)  
23 [proceedings/economic-analysis-protected-](http://www.sampaa.org/publications/conference-proceedings-1991-2000/2003-proceedings/economic-analysis-protected-areas/Bowman%20and%20Eagles%202004.pdf/view)  
24 [areas/Bowman%20and%20Eagles%202004.pdf/view](http://www.sampaa.org/publications/conference-proceedings-1991-2000/2003-proceedings/economic-analysis-protected-areas/Bowman%20and%20Eagles%202004.pdf/view)>
- 25 Boyd, D., and G. K. Neale. 1992. An adult cougar (*Felis concolor*) killed by gray wolves (*Canis lupus*) in  
26 Glacier National Park, Montana. *Canadian Field-Naturalist* 106: 524-525.
- 27 Boyd, D. K and D. H. Pletscher. 1999. Characteristics of dispersal in a colonizing wolf population in  
28 the central Rocky Mountains. *Journal of Wildlife Management* 63:1094-1108.
- 29 Boyd, D. K., S. H. Forbes, D. H. Pletscher, and F. W. Allendorf. 2001. Identification of Rocky  
30 Mountain gray wolves. *Wildlife Society Bulletin* 29:78-85.
- 31 Boyd, D., P. C. Pacquet, S. Donelon, R. R. Ream, D. H. Pletscher, and C. C. White. 1995.  
32 Transboundary movements of a recolonizing wolf population in the Rocky Mountains. Pages  
33 135-140 in L. Carbyn, S. Fritts, and D. Seip, editors. *Ecology and management of wolves in a*  
34 *changing world*. Canadian Circumpolar Institute, University of Alberta, Edmonton, Alberta.
- 35 Boyd, D. K., R. R. Ream, D. H. Pletscher, and M. W. Fairchild. 1993. Variation in denning and  
36 parturition dates of a wild gray wolf, *Canis lupus*, in the Rocky Mountains. *Canadian Field-*  
37 *Naturalist* 107:359-360.
- 38 Boyd, D., R. Ream, D. Pletscher, and M. Fairchild. 1994. Prey taken by colonizing wolves and  
39 hunters in the Glacier National Park area. *Journal of Wildlife Management* 58:289-295.
- 40 Boyd-Heger, D. K. 1997. Dispersal, genetic relationships, and landscape use by colonizing wolves in  
41 the central Rocky Mountains. Ph.D. dissertation, University of Montana, Missoula, Montana.  
42 184 pp.
- 43 Bradley, E. H. and D. H. Pletscher. 2005. Assessing factors related to wolf depredation of cattle in  
44 fenced pastures in Montana and Idaho. *Wildlife Society Bulletin* 33:1256-1265.
- 45 Bradley, E. H., D. H. Pletscher, E. E. Bangs, K. E. Kunkel, D. W. Smith, C. M. Mack, T. J. Meier, J.  
46 A. Fontaine, C. C. Niemeyer, and J. D. Jimenez. 2005. Evaluating wolf translocation as a
-

- 1 nonlethal method to reduce livestock conflicts in the northwestern United States.  
2 Conservation Biology 19:1498-1508.
- 3 Brainerd, S. M., H. Andrén, E. E. Bangs, E. H. Bradley, J. A. Fontaine, W. Hall, Y. Iliopoulos, M. D.  
4 Jimenez, E. A. Jozwiak, O. Liberg, C. M. Mack, T. J. Meier, C. C. Niemeyer, H. C. Pedersen,  
5 H. Sand, R. N. Schultz, D. W. Smith, P. Wabakken, and A. P. Wydeven. 2008. The effects of  
6 breeder loss in wolves. *Journal of Wildlife Management* 72:89-98.
- 7 Brook, B. W., L. W. Traill, and C. J. A. Bradshaw. 2006. Minimum viable population sizes and global  
8 extinction risk are unrelated. *Ecology Letters* 9:375-382.
- 9 Buskirk, S. W. 1999. Mesocarnivores of Yellowstone. Pages 165-187 *in* T. W. Clark, A. P. Curlee, S.  
10 C. Minta, and P. M. Kareiva, editors. *Carnivores in ecosystems: the Yellowstone experience*.  
11 Yale University Press, New Haven, Connecticut.
- 12 Cahalane, V. H. 1939. The evolution of predator control policy in the national parks. *Journal of*  
13 *Wildlife Management* 3:229-237.
- 14 Callahan, J. 2011. Public opinion on wolves and wolf management in Washington. Unpublished  
15 report, San Jose State University, San Jose, California.
- 16 Cameron, A. B. 1949. Letter to Victor B. Scheffer, September 5, 1949. Unpublished document on  
17 file at Washington Department of Fish and Wildlife, Olympia, Washington.
- 18 Campbell, B. H., B. Altman, E. E. Bangs, D. W. Smith, B. Csuti, D. W. Hays, F. Slavens, K. Slavens,  
19 C. Schultz, and R. W. Butler. 2006. Restoring wildlife populations. Pages 351-373 *in* D.  
20 Apostol and M. Sinclair, editors. *Restoring the Pacific Northwest: the art and science of*  
21 *ecological restoration in Cascadia*. Island Press, Washington, D.C.
- 22 Carbyn, L. N. 1982. Coyote population fluctuations and spatial distribution in relation to wolf  
23 territories in Riding Mountain National Park, Manitoba. *Canadian Field-Naturalist* 96:176-183.
- 24 Cariappa, C. A., J. K. Oakleaf, W. B. Ballard, and S. W. Breck. 2011. A reappraisal of the evidence  
25 for regulation of wolf populations. *Journal of Wildlife Management* 75:726-730.
- 26 Carrera, R., W. Ballard, P. Gipson, B. T. Kelly, P. R. Krausman, M. C. Wallace, C. Villalobos, and D.  
27 B. Webster. 2008. Comparison of Mexican wolf and coyote diets in Arizona and New Mexico.  
28 *Journal of Wildlife Management* 72:376-381.
- 29 Carroll, C. 2007. Application of habitat models to wolf recovery planning in Washington.  
30 Unpublished report.
- 31 Carroll, C., M. K. Phillips, C. A. Lopez-Gonzalez, and N. H. Schumaker. 2006. Defining recovery  
32 goals and strategies for endangered species: the wolf as a case study. *BioScience* 56:25-37.
- 33 Carroll C., M. K. Phillips, N. H. Schumaker, and D. W. Smith. 2003. Impacts of landscape change  
34 on wolf restoration success: planning a reintroduction program based on static and dynamic  
35 spatial models. *Conservation Biology* 17:536-548.
- 36 Christianson, D. and S. Creel. 2010. A nutritionally mediated risk effect of wolves on elk. *Ecology*  
37 91:1184-1191.
- 38 Church, B. 1996. Wolves in Washington: an overview of the history, present status, and potential  
39 future for wolves in Olympic National Park and the North Cascade Mountains. Wolf Haven  
40 International, Tenino, Washington.
- 41 Cockle, R. 2008. Idaho wolf spotted in northeast Oregon. *The Oregonian* 2008(January 25).  
42 Confederated Salish and Kootenai Tribes Tribal Wildlife Management Program. 2009. Northern  
43 gray wolf management plan for the Flathead Indian Reservation. Confederated Salish and  
44 Kootenai Tribes Tribal Wildlife Management Program, Pablo, Montana.  
45 <<http://www.fws.gov/mountain-prairie/species/mammals/wolf/>>
- 46 Conover, M. R. 2001. Resolving human-wildlife conflicts: the science of wildlife damage  
47 management. CRC Press, Boca Raton, Florida.

- 
- Crabtree, R. L., and J. W. Sheldon. 1999. The ecological role of coyotes on Yellowstone's Northern Range. *Yellowstone Science* 7:15-23.
- Creel, S. and J. J. Rotella. 2010. Meta-analysis of relationships between human offtake, total mortality and population dynamics of gray wolves (*Canis lupus*). *PLoS ONE* 5(9):e12918.
- Creel, S. and J. A. Winnie. 2005. Responses of elk herd size to fine-scale spatial and temporal variation in the risk of predation by wolves. *Animal Behavior* 69:1181-1189.
- Creel, S., J. A. Winnie, Jr., and D. Christianson. 2009. Glucocorticoid stress hormones and the effect of predation risk on elk reproduction. *Proceedings of the National Academy of Sciences* 106:12388-12393.
- Cross, P. C., E. K. Cole, A. P. Dobson, W. H. Edwards, K. L. Hamlin, G. Luikart, A. D. Middleton, B. M. Scurlock, and P. J. White. 2010. Probable causes of increasing brucellosis in free-ranging elk of the Greater Yellowstone Ecosystem. *Ecological Applications* 20:278-288.
- Cunningham, J. 2009. Hunting season/quota change supporting information: species, elk; region, 3; hunting district, 310; year, 2009. Montana Fish, Wildlife & Parks, Helena, Montana.
- Cyr, D. L. and S. B. Johnson. 2006. First aid for bee and insect stings. National Ag Safety Database and University of Maine Cooperative Extension, Maine.  
<<http://nasdonline.org/document/962/d000800/first-aid-for-bee-and-insect-stings.html>>
- Dale, B. W., L. G. Adams, and R. T. Bowyer. 1994. Functional response of wolves preying on barren-ground caribou in a multiple-prey ecosystem. *Journal of Animal Ecology* 63:644-652.
- Dalquest, W. W. 1948. Mammals of Washington. University of Kansas Publications, Museum of Natural History 2:1-444.
- Darimont, C. T., P. C. Paquet, and T. E. Reimchen. 2008. Spawning salmon disrupt trophic coupling between wolves and ungulate prey in coastal British Columbia. *BMC Ecology* 8:14 (12 pp).
- Darimont, C. T., P. C. Paquet, and T. E. Reimchen. 2009. Landscape heterogeneity and marine subsidy generate extensive intrapopulation niche diversity in a large terrestrial vertebrate. *Journal of Landscape Ecology* 78:126-133.
- Darimont, C. T., M. H. H. Price, N. N. Winchester, J. Gordon-Walker, and P. C. Paquet. 2004. Predators in natural fragments: foraging ecology of wolves in British Columbia's central and north coast archipelago. *Journal of Biogeography* 31:1867-1877.
- Darimont, C. T., T. E. Reimchen, and P. C. Paquet. 2003. Foraging behavior by gray wolves on salmon streams in coastal British Columbia. *Canadian Journal of Zoology* 81:349-353.
- Dean, R., S. Werbelow, and B. Holz. 2003. A note about the effects of introduced wolves on the operations of elk feedgrounds in western Wyoming. *Proceedings of the Western States and Provinces Deer and Elk Workshop* 5:23-29.
- DelGiudice, G. D., J. Fieberg, M. R. Riggs, M. Carstensen Powell, and W. Pan. 2006. A long-term age-specific survival analysis of female white-tailed deer. *Journal of Wildlife Management* 70:1556-1568.
- DelGiudice, G. D., K. R. McCaffery, D. E. Beyer, Jr., and M. E. Nelson. 2009. Prey of wolves in the Great Lakes region. Pages 155-173 in A. P. Wydeven, T. R. Van Deelen, and E. J. Heske, editors. *Recovery of gray wolves in the Great Lakes region of the United States: an endangered species success story*. Springer, New York, New York.
- DelGiudice, G. D., M. R. Riggs, P. Joly, and W. Pan. 2002. Winter severity, survival, and cause-specific mortality of female white-tailed deer in north-central Minnesota. *Journal of Wildlife Management* 66:698-717.
- Demma, D. J. and L. D. Mech. 2009. Wolf use of summer territory in northeastern Minnesota. *Journal of Wildlife Management* 73:380-384.
-

- Dietsch, A. M., T. L. Teel, M. J. Manfredo, S. A. Jonker, and S. Pozzanghera. 2011. State report for Washington from the research project entitled "Understanding People in Places." Project Report for the Washington Department of Fish and Wildlife. Department of Human Dimensions of Natural Resources, Colorado State University, Fort Collins, Colorado. <<http://wdfw.wa.gov/publications/pub.php?id=01190>>
- Douglas, D. 1914. Journal kept by David Douglas during his travels in North America, 1823-1827, together with a particular description of thirty three species of American oaks and eighteen species of *Pinus*. William Wesley & Son, London.
- DOW (Defenders of Wildlife). 2009. All wolf compensation payments paid by Defenders to ranchers in the Northern Rockies and Southwest. Defenders of Wildlife, Washington, D.C. <[http://www.defenders.org/programs\\_and\\_policy/wildlife\\_conservation/solutions/wolf\\_compensation\\_trust/index.php](http://www.defenders.org/programs_and_policy/wildlife_conservation/solutions/wolf_compensation_trust/index.php)>
- Druzin, H. 2007. Experts, environmentalists, hunters aren't sure if wolf tourism is doable in Idaho. Idaho Statesman 2007(July 13).
- Duda, M. D., T. Beppler, S. J. Bissell, A. Criscione, B. Hepler, J. B. Herrick, M. Jones, A. Ritchie, C. L. Schilli, T. Winegord, and A. Lanier. 2008a. Public opinion on hunting and wildlife management in Washington. Responsive Management, Harrisonburg, Virginia. <<http://wdfw.wa.gov/publications/pub.php?id=00433>>
- Duda, M. D., T. Beppler, S. J. Bissell, A. Criscione, B. Hepler, J. B. Herrick, M. Jones, A. Ritchie, C. L. Schilli, T. Winegord, and A. Lanier. 2008b. Hunters' opinions on wildlife management and other hunting issues in Washington. Responsive Management, Harrisonburg, Virginia. <<http://wdfw.wa.gov/publications/pub.php?id=00433>>
- Duffield, J. and C. Neher. 1996. Economics of wolf recovery in Yellowstone National Park. Transactions of the North American Wildlife and Natural Resources Conference 61:285-292.
- Duffield, J. W., C. J. Neher, and D. A. Patterson. 2006. Integrating landscape-scale economic and ecological models in the Greater Yellowstone Area: application to wolf recovery. Pages 53-58 in A. W. Biel, editor. Greater Yellowstone public lands: a century of discovery, hard lessons, and bright prospects. Proceedings of 8th Biennial Conference on the Greater Yellowstone Ecosystem, Yellowstone National Park, Wyoming.
- Duffield, J. W., C. J. Neher, and D. A. Patterson. 2008. Wolf recovery in Yellowstone: park visitor attitudes, expenditures, and economic impacts. *Yellowstone Science* 16(1):20-25.
- Duman, B. 2001. Differentiating Great Lakes Area native wild wolves from dogs and wolf-dog hybrids. Earth Voices LLC, Howell, Michigan. 35 pp.
- Eberhardt, L. L., P. J. White, R. A. Garrott, and D. B. Houston. 2007. A seventy-year history of trends in Yellowstone's northern elk herd. *Journal of Wildlife Management* 71:594-602.
- Edge, J. L., D. E. Beyer, Jr., J. L. Belant, M. J. Jordan, and B. J. Roell. 2011. Livestock and domestic dog predations by wolves in Michigan. *Human-Wildlife Interactions* 5:66-78.
- Edson, J. M. 1931. Again the big-game of the Mount Baker district, Washington. *Murrelet* 12:50-53.
- Erb, J. 2008. Distribution and abundance of wolves in Minnesota, 2007-08. Minnesota Department of Natural Resources, Grand Rapids, Minnesota.
- ERFC (Economic and Revenue Forecast Council). 2007a. Washington state economic climate study. Washington State Economic and Revenue Forecast Council, Olympia, Washington. <<http://www.erfc.wa.gov/publications/documents/climate2007.pdf>>
- ERFC (Economic and Revenue Forecast Council). 2007b. Washington economic and revenue forecast. Report Number 30(4), Economic and Revenue Forecast Council, Olympia, Washington. <<http://www.erfc.wa.gov/publications/documents/nov07pub.pdf>>

- 
- 1 Estes, J. A. and D. O. Duggins. 1995. Sea otters and kelp forests in Alaska: generality and variation  
2 in a community ecological paradigm. *Ecological Monographs* 65:75-100.
- 3 Fitkin, S. and J. Heinlen. 2010. Deer status and trend report: Region 2. Pages 16-19 in Washington  
4 Department of Fish and Wildlife. 2010 game status and trend report. Washington Department  
5 of Fish and Wildlife, Olympia, Washington. 279 pp.
- 6 Flather, C. H., G. D. Hayward, S. R. Beissinger, and P. A. Stephens. 2011. Minimum viable  
7 populations: is there a 'magic number' for conservation practitioners? *Trends in Ecology and*  
8 *Evolution* 26:307-316.
- 9 Forbes, S. H. and D. K. Boyd. 1996. Genetic variation of naturally colonizing wolves in the central  
10 Rocky Mountains. *Conservation Biology* 10:1082-1090.
- 11 Forbes, S. H. and D. K. Boyd. 1997. Genetic structure and migration in native and reintroduced  
12 Rocky Mountain wolf populations. *Conservation Biology* 11:1226-1234.
- 13 Foreyt, W. J., M. L. Drew, M. Atkinson, and D. McCauley. 2009. *Echinococcus granulosus* in gray  
14 wolves and ungulates in Idaho and Montana, USA. *Journal of Wildlife Diseases* 45:1208-1212.
- 15 Fowler, P. and P. Wik. 2010a. Elk status and trend report: Region 1, PMU 13 – GMUs 145, 149,  
16 154, 157, 162, 163, 166, 169, 172, 175, 178, 181, 186. Pages 74-77 in Washington Department  
17 of Fish and Wildlife. 2010 game status and trend report. Washington Department of Fish and  
18 Wildlife, Olympia, Washington. 279 pp.
- 19 Fowler, P. and P. Wik. 2010b. Bighorn sheep status and trend report: Region 1, Blue Mountains.  
20 Pages 138-146 in Washington Department of Fish and Wildlife. 2010 game status and trend  
21 report. Washington Department of Fish and Wildlife, Olympia, Washington. 279 pp.
- 22 Frame, P. F., H. D. Cluff, and D. S. Hik. 2007. Response of wolves to experimental disturbance at  
23 homesites. *Journal of Wildlife Management* 71:316-320.
- 24 Fredrickson, R. J., P. Siminski, M. Wolf, and P. H. Hedrick. 2007. Genetic rescue and inbreeding  
25 depression in Mexican wolves. *Proceedings of the Royal Society, Series B* 274:2365-2371.
- 26 Fritts, S. H. and L. N. Carbyn. 1995. Population viability, nature reserves, and the outlook for gray  
27 wolf conservation in North America. *Restoration Ecology* 3:26-28.
- 28 Fritts, S. H. and L. D. Mech. 1981. Dynamics, movements, and feeding ecology of a newly protected  
29 wolf population in northwestern Minnesota. *Wildlife Monographs* 80:1-79.
- 30 Fritts, S. H., E. E. Bangs, J. A. Fontaine, W. G. Brewster, and J. F. Gore. 1995. Restoring wolves to  
31 the northern Rocky Mountains of the United States. Pages 107-125 in L. Carbyn, S. Fritts, and  
32 D. Seip, editors. *Ecology and management of wolves in a changing world*. Canadian  
33 Circumpolar Institute, University of Alberta, Edmonton, Alberta.
- 34 Fritts, S. H., E. E. Bangs, and J. F. Gore. 1994. The relationship of wolf recovery to habitat  
35 conservation and biodiversity in northwestern United States. *Landscape and Urban Planning*  
36 28:23-32.
- 37 Fritts, S. H., W. J. Paul, and L. D. Mech. 1984. Movements of translocated wolves in Minnesota.  
38 *Journal of Wildlife Management* 48:709-721.
- 39 Fritts, S. H., W. J. Paul, and L. D. Mech. 1985. Can relocated wolves survive? *Wildlife Society*  
40 *Bulletin* 13:459-463.
- 41 Fritts, S. H., W. J. Paul, and L. D. Mech, and D. P. Scott. 1992. Trends and management of wolf-  
42 livestock conflicts in Minnesota. U.S. Fish and Wildlife Service, Resource Publication 181.
- 43 Fritts, S. H., R. O. Stephenson, R. D. Hayes, and L. Boitani. 2003. Wolves and humans. Pages 289-  
44 316 in L. D. Mech and L. Boitani, editors. *Wolves: behavior, ecology, and conservation*.  
45 University of Chicago Press, Chicago, Illinois.
- 46 Fuller, T. K. 1989. Population dynamics of wolves in north-central Minnesota. *Wildlife Monographs*  
47 105:1-41.
-

- Fuller, T. K., L. D. Mech, and J. F. Cochrane. 2003. Wolf population dynamics. Pages 161-191 in L. D. Mech and L. Boitani, editors. *Wolves: behavior, ecology, and conservation*. University of Chicago Press, Chicago, Illinois.
- Gaines, W. L., G. K. Neale, and R. H. Naney. 1995. Response of coyotes and gray wolves to simulated howling in north-central Washington. *Northwest Science* 69:217-222.
- Gaines, W. L., P. Singleton, and A. L. Gold. 2000. Conservation of rare carnivores in the North Cascades Ecosystem, western North America. *Natural Areas Journal* 20:366-375.
- Garrott, R. A., J. A. Gude, E. J. Bergman, C. Gower, P. J. White, and K. L. Hamlin. 2005. Generalizing wolf effects across the Greater Yellowstone Area: a cautionary note. *Wildlife Society Bulletin* 33:1245-1255.
- Gasaway, W. C., R. D. Boertje, D. V. Grangaard, D. G. Kellyhouse, R. O. Stephenson, and D. G. Larsen. 1992. The role of predation in limiting moose at low densities in Alaska and Yukon and implications for conservation. *Wildlife Monographs* 120:1-59.
- Gehring, T. M., B. E. Kohn, J. L. Gehring, and E. M. Anderson. 2003. Limits to plasticity in gray wolf, *Canis lupus*, pack structure: conservation implications for recovering populations. *Canadian Field-Naturalist* 117:419-423.
- Gehring, T. M., K. C. VerCauteren, M. L. Provost, and A. C. Cellar. 2010a. Utility of livestock-protection dogs for deterring wildlife from cattle farms. *Wildlife Research* 37:715-721.
- Gehring, T. M., K. C. VerCauteren, and J.-M. Landry. 2010b. Livestock protection dogs in the 21st century: is an ancient tool relevant to modern conservation challenges? *Bioscience* 60:299-308.
- Gibson, J. R. 1985. *Farming the frontier: the agricultural opening of the Oregon Country, 1786-1846*. University of Washington Press, Seattle, Washington.
- Gipson, P. S., E. E. Bangs, T. N. Bailey, D. K. Boyd, H. D. Cluff, D. W. Smith, and M. D. Jiminez. 2002. Color patterns among wolves in western North America. *Wildlife Society Bulletin* 30:821-830.
- Griffin, K. A., M. Hebblewhite, H. S. Robinson, P. Zager, S. M. Barber-Meyer, D. Christianson, S. Creel, N. C. Harris, M. A. Hurley, D. H. Jackson, B. K. Johnson, W. L. Myers, J. D. Raithel, M. Schlegel, B. L. Smith, C. White, and P. J. White. 2011. Neonatal mortality of elk driven by climate, predator phenology and predator community composition. *Journal of Animal Ecology* doi: 10.1111/j.1365-2656.2011.01856.x.
- Griffin, S. C., M. L. Taper, R. Hoffman, and L. S. Mills. 2008 The case of the missing marmots: are metapopulation dynamics or range-wide declines responsible? *Biological Conservation* 141:1293-1309.
- Grooms, S. 2007. Ontario experiences cluster of wolf-human encounters. *International Wolf* 17(3):11-13.
- Guenther, S. E. 1952. A wolf record for Washington state. *Murrelet* 33:14.
- Haight, R. G., D. J. Mladenoff, and A. P. Wydeven. 1998. Modeling disjunct gray wolf populations in semi-wild landscapes. *Conservation Biology* 12:879-888.
- Hairston, N. G., F. E. Smith, and L. B. Slobodkin. 1960. Community, population control, and competition. *American Naturalist* 94:421-425.
- Hamlin, K. L. and J. A. Cunningham. 2009. Monitoring and assessment of wolf-ungulate interactions and population trends within the Greater Yellowstone Area, southwestern Montana, and Montana statewide, final report. Montana Fish, Wildlife & Parks, Helena, Montana.
- Hamlin, K. L., R. A. Garrott, P. J. White, and J. A. Cunningham. 2009. Contrasting wolf-ungulate interactions in the greater Yellowstone ecosystem. Pages 541-577 in R. A. Garrott, P. J. White,

- and F. G. R. Watson, editors. The ecology of large mammals in central Yellowstone: sixteen years of integrated field studies. Academic Press, San Diego, California.
- Hansen, H. J. 1986. Wolves of northern Idaho and northeastern Washington. Montana Cooperative Wildlife Research Unit, U.S. Fish and Wildlife Service, Missoula, Montana.
- Harding, A. R. 1909. Wolf and coyote trapping: an up-to-date wolf hunter's guide, giving the most successful methods of experienced "wolfers" for hunting and trapping these animals, also gives their habits in detail. A. R. Harding Publishing Company, Columbus, Ohio.
- Harper, E. K., W. J. Paul, L. D. Mech, and S. Weisberg. 2008. Effectiveness of lethal, directed wolf-depredation control in Minnesota. *Journal of Wildlife Management* 72:778-784.
- Harris, R. and R. Ream. 1983. A method to aid in discrimination of tracks from wolves and dogs. Canadian Wildlife Service Report Series 45:120-124.
- Hart, J. 2008. USDA-Wildlife Services wolf damage management in Minnesota 2008. USDA-APHIS-Wildlife Services, Grand Rapids, Minnesota.
- Hawley, J. E., T. M. Gehring, R. N. Schulz, S. T. Rossler, and A. P. Wydeven. 2009. Assessment of shock collars as nonlethal management for wolves in Wisconsin. *Journal of Wildlife Management* 73:518-525.
- Hayes, R. D. and J. R. Gunson. 1995. Status and management of wolves in Canada. Pages 21-33 *in* L. N. Carbyn, S. H. Fritts, and D. R. Siep, editors. Ecology and conservation of wolves in a changing world. Occasional Publication Number 35, Canadian Circumpolar Institute, University of Alberta, Edmonton, Alberta.
- Hayes, R. D. and A. S. Harestad. 2000. Wolf functional response and regulation of moose in the Yukon. *Canadian Journal of Zoology* 78:60-66.
- Hayes, R. D., R. Farnell, R. M. P. Ward, J. Carey, M. Dehn, G. W. Kuzyk, A. M. Baer, C. L. Gardner, and M. O'Donoghue. 2003. Experimental reduction of wolves in the Yukon: Ungulate responses and management implications. *Wildlife Monographs* 152:1-35.
- Heath, J. 1979. *Memoirs of Nisqually*. Ye Galleon Press, Fairfield, Washington.
- Hebblewhite, M. 2005. Predation by wolves interacts with the North Pacific Oscillation (NPO) on a western North American elk population. *Journal of Animal Ecology* 74:226-233.
- Hebblewhite, M. and E. H. Merrill. 2007. Multiscale wolf predation risk: does migration reduce risk? *Oecologia* 152:377-387.
- Hebblewhite, M. and D. W. Smith. 2010. Wolf community ecology: ecosystem effects of recovering wolves in Banff and Yellowstone national parks. Pages 69-120 *in* M. Musiani, L. Boitani, and P. C. Paquet. The world of wolves: new perspectives on ecology, behavior, and management. University of Calgary Press, Calgary, Alberta.
- Hebblewhite, M., E. H. Merrill, L. E. Morgantini, C. A. White, J. R. Allen, E. Bruns, L. Thurston, and T. E. Hurd. 2006. Is migratory behavior of montane elk herds in peril? The case of Alberta's Ya Ha Tinda elk herd. *Wildlife Society Bulletin* 34:1280-1294.
- Hebblewhite, M., M. Musiani, and L. S. Mills. 2010. Restoration of genetic connectivity among northern Rockies wolf populations. *Molecular Ecology* 19:4383-4385.
- Hebblewhite, M., D. H. Pletscher, and P. C. Paquet. 2002. Elk predation dynamics in areas with and without predation by recolonizing wolves in Banff National Park, Alberta. *Canadian Journal of Zoology* 80:789-799.
- Herrero, S., A. Higgins, J. E. Cardoza, L. I. Hajduk, and T. S. Smith. 2011. Fatal attacks by American black bear on people: 1900-2009. *Journal of Wildlife Management* 75:596-603.
- Hornocker, M. G. and T. K. Ruth. 1997. Cougar-wolf interaction in the North Fork of the Flathead River, Montana. Hornocker Wildlife Institute, Moscow, Idaho.

- Houts, M. E. 1999. Modeling gray wolf habitat in the northern Rocky Mountains. M.S. thesis, University of Kansas, Lawrence, Kansas.
- Houts, M. E. 2003. Using logistic regression to model wolf habitat suitability in the northern Rocky Mountains. World Wolf Congress, Banff, Alberta.
- Howery, L. D. and T. J. DeLiberto. 2004. Indirect effects of carnivores on livestock foraging behavior and production. *Sheep and Goat Research Journal* 19:53-57.
- Huggard, D. J. 1993. Prey selectivity of wolves in Banff National Park. I. Prey species. *Canadian Journal of Zoology* 71:130-139.
- Husseman, J. S., D. L. Murray, G. Power, C. Mack, C. R. Wenger, and H. Quigley. 2003. Assessing differential prey selection patterns between two sympatric large carnivores. *Oikos* 101:591-601.
- IDFG (Idaho Department of Fish and Game). 2004. White-tailed deer management plan, 2005-2014. Idaho Department of Fish and Game, Boise, Idaho.
- IDFG (Idaho Department of Fish and Game). 2008. Idaho wolf population management plan, 2008-2012. Idaho Department of Fish and Game, Boise, Idaho.  
<<http://fishandgame.idaho.gov/cms/wildlife/wolves/manage/PopManagePlan.pdf>>
- IDFG (Idaho Department of Fish and Game). 2010a. Study shows effects of predators on Idaho elk. *Idaho Fish and Game News* 22(2):1-4.
- IDFG (Idaho Department of Fish and Game). 2010b. Idaho rule 10(j) proposal, Lolo zone. Idaho Department of Fish and Game, Boise, Idaho.
- IDFG (Idaho Department of Fish and Game). 2011. Director's annual report to the commission, FY 2010. Idaho Department of Fish and Game, Boise, Idaho.
- Jacoby, J. 2007. Local wolves not all lone. *Baker City Herald* 2007(December 4).
- Jaffe, R. 2001. Winter wolf predation in an elk-bison system in Yellowstone National Park. M.S. thesis, Montana State University, Bozeman, Montana.
- Jenkins, K. J. and B. F. Manley. 2008. A double observer method for reducing bias in faecal pellet surveys of forest ungulates. *Journal of Applied Ecology* 45:1339-1348.
- Jimenez, M. D., V. J. Asher, C. Bergman, E. E. Bangs, and S. P. Woodruff. 2008. Gray wolves, *Canis lupus*, killed by cougars, *Puma concolor*, and a grizzly bear, *Ursus arctos*, in Montana, Alberta, and Wyoming. *Canadian Field-Naturalist* 122:76-78.
- Jimenez, M. D., E. E. Bangs, M. Drew, S. Nadeau, V. J. Asher, and C. Sime. 2010b. Dog lice (*Trichodectes canis*) found on wolves (*Canis lupus*) in Montana and Idaho. *Northwestern Naturalist* 91:331-333.
- Jimenez, M. D., E. E. Bangs, C. Sime, and V. J. Asher. 2010a. Sarcoptic mange found in wolves in the Rocky Mountains in western United States. *Journal of Wildlife Diseases* 46:1120-1125.
- Johnson, M. L. and S. Johnson. 1952. Check list of mammals of the Olympic Peninsula. *Murrelet* 33:32-37.
- Johnson, M. R., D. K. Boyd, and D. H. Pletscher. 1994. Serologic investigations of canine parvovirus and canine distemper in relation to wolf (*Canis lupus*) pup mortalities. *Journal of Wildlife Diseases* 30:270-273.
- Karlsson, J. and M. Sjöström. 2007. Human attitudes towards wolves, a matter of distance. *Biological Conservation* 137:610-616.
- Kaufman, M. J., N. Varley, D. W. Smith, D. R. Stahler, D. R. McNulty, and M. S. Boyce. 2007. Landscape heterogeneity shapes predation in a newly restored predator-prey system. *Ecology Letters* 10:690-700.
- Kauffman, M. J., J. F. Brodie, and E. S. Jules. 2010. Are wolves saving Yellowstone's aspen? A landscape-level test of a behaviorally mediated trophic cascade. *Ecology* 91:2742-2755.
- Keith, L. 1983. Population dynamics of wolves. *Canadian Wildlife Service Report Series* 45:66-77.

- 
- 1 Kirkwood, S. 2006. Wolf & consequence. National Parks 2006(winter).
- 2 Kojola, I., S. Kaartinen, A. Hakala, S. Heikkinen, and H.-M. Voipio. 2009. Dispersal behavior and  
3 the connectivity between wolf populations in northern Europe. *Journal of Wildlife*  
4 *Management* 73:309-313.
- 5 Kortello, A. D., T. E. Hurd, and D. L. Murphy. 2007. Interactions between cougars (*Puma concolor*)  
6 and gray wolves (*Canis lupus*) in Banff National Park, Alberta. *Ecoscience* 14:214-222.
- 7 Kreeger, T. J. 2003. The internal wolf: physiology, pathology, and pharmacology. Pages 192-217 *in*  
8 L. D. Mech and L. Boitani, editors. *Wolves: behavior, ecology, and conservation*. University of  
9 Chicago Press, Chicago, Illinois.
- 10 Krefling, L. W. 1969. The rise and fall of the coyote on Isle Royale. *Naturalist* 20:25-31.
- 11 Kroeger, T., F. Casey, and C. Haney. 2006. Reintroduction of the Mexican wolf (*Canis lupus baileyi*) to  
12 the southwestern United States: an economic perspective. Paper presented at the 18<sup>th</sup> Annual  
13 North American Wolf Conference, Chico Hot Springs, Montana.  
14 <[http://www.defenders.org/programs\\_and\\_policy/biodiversity\\_partners/publications.php](http://www.defenders.org/programs_and_policy/biodiversity_partners/publications.php)>
- 15 Kunkel, K. and D. H. Pletscher. 1999. Species specific population dynamics of cervids in a  
16 multipredator ecosystem. *Journal of Wildlife Management* 63:1082-1093.
- 17 Kunkel, K. E., D. H. Pletscher, D. K. Boyd, R. R. Ream, and M. W. Fairchild. 2004. Factors  
18 correlated with foraging behavior in wolves in and near Glacier National Park, Montana.  
19 *Journal of Wildlife Management* 68:167-178.
- 20 Kunkel, K. E., T. K. Ruth, D. H. Pletscher, and M. G. Hornocker. 1999. Winter prey selection by  
21 wolves and cougars in and near Glacier National Park, Montana. *Journal of Wildlife*  
22 *Management* 63:901-910.
- 23 Lance, N. J., S. W. Breck, C. Sime, P. Callahan, and J. A. Shivik. 2010. Biological, technical, and  
24 social aspects of applying electrified fladry for livestock protection from wolves (*Canis lupus*).  
25 *Wildlife Research* 37:708-714.
- 26 Langley, R. L. and W. E. Morrow. 1997. Deaths resulting from animal attacks in the United States.  
27 *Wilderness and Environmental Medicine* 8:8-16.
- 28 Laporte, I., T. B. Muhly, J. A. Pitt, M. Alexander, and M. Musiani. 2010. Effects of wolves on elk  
29 and cattle behaviors: implications for livestock production and wolf conservation. *PLoS ONE*  
30 5:e11954.
- 31 Larrison, E. J. 1947. Miscellaneous distributional notes for Washington. *Murrelet* 28:11-13.
- 32 Larsen, D. G., D. A. Gauthier, and R. L. Markel. 1989. Causes and rate of moose mortality in the  
33 southwest Yukon. *Journal of Wildlife Management* 53:548-557.
- 34 Larsen, T. and W. J. Ripple. 2006. Modeling gray wolf (*Canis lupus*) habitat in the Pacific Northwest,  
35 U.S.A. *Journal of Conservation Planning* 2:17-33.
- 36 Lash, G. Y. B. and P. Black. 2005. Red wolves: creating economic opportunity through ecotourism  
37 in rural North Carolina. *Defenders of Wildlife*, Washington, D.C.  
38 <[http://www.defenders.org/index\\_v2.html](http://www.defenders.org/index_v2.html)>
- 39 Laufer, J. R. and P. T. Jenkins. 1989. A preliminary study of gray wolf history and status in the  
40 region of the Cascade Mountains of Washington State. *Wolf Haven America*, Tenino,  
41 Washington.
- 42 Layser, E. F. 1970. Sightings of wolves, Sullivan Lake Ranger District, Colville Nat. For., Pend  
43 Oreille Co., Wash. Pages 243-246 *in* Washington State Fish and Game Big Game Status Report  
44 1974-1975, Olympia, Washington.
- 45 Lehmkuhler, J., G. Palmquist, D. Ruid, B. Willging, and A. Wydeven. 2007. Effects of wolves and  
46 other predators on farms in Wisconsin: beyond verified losses. Pub-ER-658 2007, Wisconsin  
47 Department of Natural Resources, Madison, Wisconsin.
-

- 
- 1 Liberg, O., H. Andren, H.-C. Pedersen, H. Sand, D. Sejberg, P. Wabakken, M. Åkesson, and S.  
2 Bensch. 2005. Severe inbreeding depression in a wild wolf (*Canis lupus*) population. *Biology*  
3 *Letters* 1:17-20.
- 4 Lien, C. 2001. Exploring the Olympic Mountains: accounts of the earliest expeditions, 1878-1890.  
5 The Mountaineers Books, Seattle, Washington.
- 6 Linnell, J. D. C., R. Anderson, Z. Andersone, L. Balciauskas, J. C. Blanco, L. Boitani, S. Brainderd,  
7 U. Breitenmoser, I. Kojola, O. Liberg, J. Loe, H. Okarma, H. C. Pedersen, C. Promberger, H.  
8 Sand, E. J. Solberg, H. Valdmann, and P. Wabakken. 2002. The fear of wolves: a review of  
9 wolf attacks on humans. *NINA Oppdragsmelding* 731:1-65.
- 10 Linsley, N. C. 1889. The Pend d'Oreille country. *Forest and Stream* 33:227-228.
- 11 Mack, C. M. and K. Laudon. 1998. Idaho wolf recovery project: recovery and management of gray  
12 wolves in Idaho. Annual Report 1995-1998. Nez Perce Tribe, Department of Wildlife  
13 Management, Lapwai, Idaho. 19 pp.
- 14 MacNulty, D. R., D. W. Smith, J. A. Vucetich, L. D. Mech, D. R. Stahler, and C. Packer. 2009.  
15 Predatory senescence in ageing wolves. *Ecology Letters* 12:1-10.
- 16 Macy, P. P. 1934. Some notes on the animal life of Mount Rainier National Park, Washington.  
17 *Murrelet* 15:46-48.
- 18 Mao, J. S., M. S. Boyce, D. W. Smith, F. J. Singer, D. J. Vales, J. M. Vore, and E. H. Merrill. 2005.  
19 Habitat selection by elk before and after wolf reintroduction in Yellowstone National Park.  
20 *Journal of Wildlife Management* 69:1691-1707.
- 21 Martino, T. T. 1997. The wolf, the woman, the wilderness: a true story of returning home. NewSage  
22 Press, Troutdale, Oregon.
- 23 Martorello, D. A. 2010a. Bighorn sheep status and trend report: statewide. Pages 127-128 *in*  
24 Washington Department of Fish and Wildlife. 2010 game status and trend report. Washington  
25 Department of Fish and Wildlife, Olympia, Washington. 279 pp.
- 26 Martorello, D. A. 2010b. Mountain goat status and trend report: statewide. Pages 105-106 *in*  
27 Washington Department of Fish and Wildlife. 2010 game status and trend report. Washington  
28 Department of Fish and Wildlife, Olympia, Washington. 279 pp.
- 29 Mazur, K. 2011. Anticipating gray wolf recolonization in Washington State: stakeholder frames of  
30 management perspectives. M.S. thesis, University of Washington, Seattle, Washington.
- 31 McCorquodale, S., P. Wik, P. Fowler, and T. Owens. 2010. Elk survival and mortality factors in the  
32 Blue Mountains of Washington, 2003-2006. Washington Department of Fish and Wildlife,  
33 Olympia, Washington.
- 34 McCorquodale, S. M., R. Wiseman, and C. L. Marcum. 2003. Survival and harvest vulnerability of elk  
35 in the Cascade Range of Washington. *Journal of Wildlife Management* 67:248-257.
- 36 McNay, M. E. 2002a. Wolf-human interactions in Alaska and Canada: a review of the case history.  
37 *Wildlife Society Bulletin* 30:831-843.
- 38 McNay, M. E. 2002b. A case history of wolf-human encounters in Alaska and Canada. Technical  
39 Bulletin 13, Alaska Department of Fish and Game, Juneau, Alaska.  
40 <[http://www.wildlife.alaska.gov/pubs/techpubs/research\\_pdfs/techb13\\_full.pdf](http://www.wildlife.alaska.gov/pubs/techpubs/research_pdfs/techb13_full.pdf)>
- 41 McNay, M. E. 2007. A review of evidence and findings related to the death Kenton Carnegie on  
42 November 8, 2005 near Points North, Saskatchewan. Alaska Department of Fish and Game,  
43 Fairbanks, Alaska.
- 44 MDNR (Minnesota Department of Natural Resources). 2001. Minnesota wolf management plan.  
45 Division of Wildlife, Minnesota Department of Natural Resources, St Paul, Minnesota.
- 46 MDNR (Michigan Department of Natural Resources). 2008. Michigan wolf management plan.  
47 Division of Wildlife, Michigan Department of Natural Resources, Lansing, Michigan.
-

- 
- 1 MDOL (Montana Department of Livestock). 2011. Livestock loss reduction & mitigation.  
2 Department of Livestock, Helena, Montana. <<http://liv.mt.gov/LLB/default.mcp>>  
3 Mech, L. D. 2001. Managing Minnesota's recovered wolves. *Wildlife Society Bulletin* 29:70-77.  
4 Mech, L. D. 1970. The wolf: the ecology and behavior of an endangered species. Natural History  
5 Press, Garden City, New York.  
6 Mech, L. D. 2007. Femur-marrow fat of white-tailed deer fawns killed by wolves. *Journal of Wildlife*  
7 *Management* 71:920-923.  
8 Mech, L. D. and L. Boitani. 2003a. Wolf social ecology. Pages 1-34 *in* L. D. Mech and L. Boitani,  
9 editors. *Wolves: behavior, ecology, and conservation*. University of Chicago Press, Chicago,  
10 Illinois.  
11 Mech, L. D. and L. Boitani. 2003b. Ecosystem effects of wolves. Pages 158-160 *in* L. D. Mech and  
12 L. Boitani, editors. *Wolves: behavior, ecology, and conservation*. University of Chicago Press,  
13 Chicago, Illinois.  
14 Mech, L. D., and M. E. Nelson. 2000. Do wolves affect white-tailed buck harvest in northeastern  
15 Minnesota? *Journal of Wildlife Management* 64:129-136.  
16 Mech, L. D. and R. O. Peterson. 2003. Wolf-prey relations. Pages 131-160 *in* L. D. Mech and L.  
17 Boitani, editors. *Wolves: behavior, ecology, and conservation*. University of Chicago Press,  
18 Chicago, Illinois.  
19 Mech, L. D., S. M. Goyal, W. J. Paul, and W. E. Newton. 2008. Demographic effects of canine  
20 parvovirus on a free-ranging wolf population over 30 years. *Journal of Wildlife Diseases*  
21 44:824-836.  
22 Mech, L. D., E. K. Harper, T. J. Meier, and W. J. Paul. 2000. Assessing factors that may predispose  
23 Minnesota farms to wolf depredation on cattle. *Wildlife Society Bulletin* 28:623-629.  
24 Merkle, J. A., D. R. Stahler, and D. W. Smith. 2009. Interference competition between gray wolves  
25 and coyotes in Yellowstone National Park. *Canadian Journal of Zoology* 87:56-63.  
26 Messier, F. 1994. Ungulate population models with predation: a case study with the North American  
27 moose. *Ecology* 75:478-488.  
28 Meyers, P. M. 2009. 2009 Columbian white-tailed deer population estimates. U.S. Fish and Wildlife  
29 Service, Julia Butler Hansen Refuge, Cathlamet, Washington.  
30 MFWP (Montana Fish, Wildlife & Parks). 2003. Montana gray wolf conservation and management  
31 plan: final environmental impact statement. Montana Fish, Wildlife & Parks, Helena, Montana.  
32 <<http://fwp.mt.gov/wildthings/management/wolf/management.html>>  
33 MFWP (Montana Fish, Wildlife & Parks). 2007a. Wolves and human safety. Montana Fish, Wildlife &  
34 Parks, Helena, Montana. <<http://fwp.mt.gov/wildthings/wolf/human.html>>  
35 MFWP (Montana Fish, Wildlife & Parks). 2007b. Wolves and big game in Montana. Montana Fish,  
36 Wildlife & Parks, Helena, Montana. <<http://fwp.mt.gov/wildthings/wolf/gamefaq.html#pop>>  
37 MFWP (Montana Fish, Wildlife & Parks). 2010. Montana rule 10(j) proposal, West Fork of the  
38 Bitterroot. Montana Fish, Wildlife & Parks, Helena, Montana.  
39 Milne, D. G., A. S. Harestad, and K. Atkinson. 1989. Diets of wolves on northern Vancouver Island.  
40 *Northwest Science* 63:83-86.  
41 Mitchell, M. S., D. E. Ausband, C. A. Sime, E. E. Bangs, J. A. Gude, M. D. Jimenez, C. M. Mack, T.  
42 J. Meier, M. S. Nadeau, and D. W. Smith. 2008. Estimation of successful breeding pairs for  
43 wolves in the northern Rocky Mountains, USA. *Journal of Wildlife Management* 72:881-891.  
44 Mladenoff, D. J., M. K. Clayton, S. D. Pratt, T. A. Sickley, and A. P. Wydeven. 2009. Change in  
45 occupied wolf habitat in the northern Great Lakes region. Pages 119-138 *in* Wydeven, T. R.  
46 Van Deelen, and E. J. Heske, editors. *Recovery of gray wolves in the Great Lakes region of*  
47 *the United States: an endangered species success story*. Springer, New York, New York.
-

- 
- 1 Mladenoff, D. J., R. G. Haight, T. A. Sickley, and A. P. Wydeven. 1997. Causes and implications of  
2 species restoration in altered ecosystems: a spatial landscape projection of wolf population  
3 recovery. *BioScience* 47:21-31.
- 4 Mladenoff, D. J., T. A. Sickley, R. G. Haight, and A. P. Wydeven. 1995. A regional landscape  
5 analysis and prediction of favorable gray wolf habitat in the northern Great Lakes region.  
6 *Conservation Biology* 9:279-294.
- 7 Mladenoff, D. J., T. A. Sickley, and A. P. Wydeven. 1999. Predicting gray wolf landscape  
8 recolonization: logistic regression models vs. new field data. *Ecological Applications* 9:37-44.
- 9 Montag, J. M., M. E. Patterson, and W. A. Freimund. 2005. The wolf viewing experience in the  
10 Lamar Valley of Yellowstone National Park. *Human Dimensions of Wildlife* 10:273-284.
- 11 Montag, J. M., M. E. Patterson, and B. Sutton. 2003. Political & social viability of predator  
12 compensation programs in the west: final project report. School of Forestry, University of  
13 Montana, Missoula, Montana.
- 14 Moore, D. A., W. M. Sischo, A. Hunter, and T. Miles. 2000. Animal bite epidemiology and  
15 surveillance for rabies postexposure prophylaxis. *Journal of the American Veterinary Medicine*  
16 *Association* 217:190-194.
- 17 Morehouse, A. T. and M. S. Boyce. 2011. From venison to beef: seasonal changes in wolf diet  
18 composition in a livestock grazing landscape. *Frontiers in Ecology and the Environment*  
19 2011:doi 10.1890/100172.
- 20 Mowat, G. 2007. Large carnivore population review for the Kootenay Region. British Columbia  
21 Ministry of Environment, Kootenay Region, Nelson, British Columbia.
- 22 Muhly, T. B. and M. Musiani. 2009. Livestock depredation by wolves and the ranching economy in  
23 the northwestern U.S. *Ecological Economics* 68:2439-2450.
- 24 Muhly, T. B., M. Alexander, M. S. Boyce, R. Creasey, M. Hebblewhite, D. Paton, J. A. Pitt, and M.  
25 Musiani. 2010b. Differential risk effects of wolves on wild versus domestic prey have  
26 consequences for conservation. *Oikos* 119:1243-1254.
- 27 Muhly, T., C. C. Gates, C. Callaghan, and M. Musiani. 2010a. Livestock husbandry practices reduce  
28 wolf depredation risk in Alberta, Canada. Pages 261-286 in M. Musiani, L. Boitani, and P. C.  
29 Paquet. *The world of wolves: new perspectives on ecology, behavior, and management*.  
30 University of Calgary Press, Calgary, Alberta.
- 31 Muñoz-Fuentes, V., C. T. Darimont, P. C. Paquet, and J. A. Leonard. 2010. The genetic legacy of  
32 extirpation and re-colonization in Vancouver Island wolves. *Conservation Genetics* 11:547-  
33 556.
- 34 Muñoz-Fuentes, V., C. T. Darimont, R. K. Wayne, P. C. Paquet, and J. A. Leonard. 2009. Ecological  
35 factors drive differentiation in wolves from British Columbia. *Journal of Biogeography*  
36 36:1516-1531.
- 37 Murie, A. 1935. *Wildlife of the Olympics*. Special Report, Wildlife Division, National Park Service,  
38 Department of the Interior, Port Angeles, Washington.
- 39 Murie, O. J. 1916-1917. Olympic Mts. notes of Olaus J. Murie, Jan. 3, 1916 to Mar. 3, 1917.  
40 Unpublished field notes on file at Washington Department of Fish and Wildlife, Olympia,  
41 Washington.
- 42 Murphy, K. 1998. The ecology of the cougar (*Puma concolor*) in the northern Yellowstone ecosystem:  
43 interactions with prey, bears, and humans. Ph.D. dissertation, University of Idaho, Moscow,  
44 Idaho.
- 45 Murray, D. L., D. W. Smith, E. E. Bangs, C. Mack, J. K. Oakleaf, J. Fontaine, D. Boyd, M. Jiminez,  
46 C. Niemeyer, T. J. Meier, D. Stahler, J. Holyan, and V. J. Asher. 2010. Death from

- anthropogenic causes is partially compensatory in recovering wolf populations. *Biological Conservation* 143:2514-2524.
- Musiani, M., C. Mamo, L. Boitani, C. Callaghan, C. C. Gates, L. Mattei, E. Visalberghi, S. Breck, and G. Volpi. 2003. Wolf depredation trends and the use of fladry barriers to protect livestock in western North America. *Conservation Biology* 17:1538-1547.
- Musiani, M., T. Muhly, C. C. Gates, C. Callaghan, M. E. Smith, and E. Tosani. 2005. Seasonality and reoccurrence of depredation and wolf control in western North America. *Wildlife Society Bulletin* 33:876-887.
- Myers, W. L., L. C. Bender, P. E. Fowler, and B. R. Lyndaker. 1999a. Population parameters and trends. Pages 43-72 in W. L. Myers, editor. *An assessment of elk population trends and habitat use with special reference to agricultural damage zones in the northern Blue Mountains of Washington*. Washington Department of Fish and Wildlife, Olympia, Washington.
- Myers, W. L., W. Y. Chang, S. S. Germaine, W. M. Vander Haegen, and T. E. Owens. 2008. *An analysis of deer and elk-vehicle collision sites along state highways in Washington state*. Washington Department of Fish and Wildlife, Olympia, Washington.
- Myers, W. L., B. Lyndaker, P. E. Fowler, and W. Moore. 1999b. *Investigations of calf elk mortalities in southeast Washington*. Progress Report, Washington Department of Fish and Wildlife, Olympia, Washington.
- NASS (National Agricultural Statistical Service). 2004. 2002 census of agriculture: Washington, state and county data. Volume 1, Geographic Area Series, Part 47, AC-02-A-47. National Agricultural Statistics Service, U.S. Department of Agriculture, Washington, D.C.  
<<http://www.agcensus.usda.gov/Publications/2002/index.asp>>
- NASS (National Agricultural Statistical Service). 2005. Sheep and goats death loss. National Agricultural Statistics Service, U.S. Department of Agriculture, Washington, D.C.  
<<http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1628>>
- NASS (National Agricultural Statistical Service). 2006. Cattle death loss. National Agricultural Statistics Service, U.S. Department of Agriculture, Washington, D.C.  
<<http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1625>>
- NASS (National Agricultural Statistical Service). 2007a. 2007 Washington agricultural bulletin. Washington Field Office, National Agricultural Statistical Service, U.S. Department of Agriculture, Olympia, Washington.  
<[http://www.nass.usda.gov/Statistics\\_by\\_State/Washington/Publications/Annual\\_Statistical\\_Bulletin/annual2007.pdf](http://www.nass.usda.gov/Statistics_by_State/Washington/Publications/Annual_Statistical_Bulletin/annual2007.pdf)>
- NASS (National Agricultural Statistical Service). 2007b. Farm labor. Report for November 2007, National Agricultural Statistical Service, U.S. Department of Agriculture, Washington, D.C.  
<<http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1063>>
- NASS (National Agricultural Statistical Service). 2007c. Meat animals production, disposition, and income: 2006 summary. Report Mt An 1-1 (07), National Agricultural Statistical Service, U.S. Department of Agriculture, Washington, D.C.  
<<http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1101>>
- National Centers for Disease Control and Prevention. 2003. Nonfatal dog bite-related injuries treated in hospital emergency departments – United States, 2001. *Morbidity and Mortality Weekly Report* 52:605-610.
- National Research Council. 1997. *Wolves, bears, and their prey in Alaska: biological and social challenges in wildlife management*. National Academy Press, Washington, D.C.
- Naughton-Treves, L., R. Grossberg, and A. Treves. 2003. Paying for tolerance: rural citizens' attitudes toward wolf depredation and compensation. *Conservation Biology* 17:1500-1511.

- 
- 1 Nelson, J. 2009. Deer status and trend report: statewide. Pages 3-5 *in* Washington Department of  
2 Fish and Wildlife. 2009 game status and trend report. Washington Department of Fish and  
3 Wildlife, Olympia, Washington. 271 pp.
- 4 Nelson, M. E. and L. D. Mech. 1986. Relationship between snow depth and gray wolf predation on  
5 white-tailed deer. *Journal of Wildlife Management* 50:471-474.
- 6 Nickerson, N., C. Oschell, L. Rademaker, and R. Dvorak. 2007. Montana's outfitting industry:  
7 economic impact and industry-client analysis. Research Report 2007-1, Institute for Tourism  
8 and Recreation Research, University of Montana, Montana. <[http://www.foam-](http://www.foam-montana.org/downloads/MTOutfittingSurveyReport.pdf)  
9 [montana.org/downloads/MTOutfittingSurveyReport.pdf](http://www.foam-montana.org/downloads/MTOutfittingSurveyReport.pdf)>
- 10 Nie, M. A. 2002. Wolf recovery and management as value-based political conflict. *Ethics, Place and*  
11 *Environment* 5:65-71.
- 12 NPS (National Park Service). 2003. Management of habituated wolves in Yellowstone National  
13 Park. National Park Service, Yellowstone National Park, Wyoming.
- 14 Oakleaf, J. K., C. Mack, and D. L. Murray. 2003. Effects of wolves on livestock calf survival and  
15 movements in central Idaho. *Journal of Wildlife Management* 67:299-306.
- 16 Oakleaf, J. K., D. L. Murray, J. R. Oakleaf, E. E. Bangs, C. M. Mack, D. W. Smith, J. A. Fontaine, M.  
17 D. Jimenez, T. J. Meier, and C. C. Niemeyer. 2006. Habitat selection by recolonizing wolves in  
18 the northern Rocky Mountains of the United States. *Journal of Wildlife Management* 70:554-  
19 563.
- 20 ODFW (Oregon Department of Fish and Wildlife). 2005. Oregon wolf conservation and  
21 management plan. Oregon Department of Fish and Wildlife, Salem, Oregon.
- 22 ODFW (Oregon Department of Fish and Wildlife). 2008. Hot topics: gray wolves. Oregon  
23 Department of Fish and Wildlife, Salem, Oregon.  
24 <<http://www.dfw.state.or.us/Wolves/index.asp>>
- 25 ODFW (Oregon Department of Fish and Wildlife). 2010. Oregon wolf conservation and  
26 management plan [updated version]. Oregon Department of Fish and Wildlife, Salem, Oregon.
- 27 OFM (Office of Financial Management). 2006. Forecast of the state population by age and sex: 1990  
28 to 2030. Office of Financial Management, Olympia, Washington.
- 29 OFM (Office of Financial Management). 2007a. April 1 population of cities, towns, and counties  
30 used for allocation of selected state revenues, State of Washington. Office of Financial  
31 Management, Olympia, Washington.
- 32 OFM (Office of Financial Management). 2007b. Median household income estimates by county:  
33 1989 to 2006 and projection for 2007. Office of Financial Management, Olympia, Washington.
- 34 OFM (Office of Financial Management). 2008. Counties with population density less than 100  
35 persons per square mile. Office of Financial Management, Olympia, Washington.
- 36 OSC (Office of Species Conservation). 2011. Wolves. Office of Species Conservation, Governor's  
37 Office, Boise, Idaho. <<http://species.idaho.gov/list/wolves.html>>
- 38 Palmquist, J. 2002. The gray wolf in Washington: species status and possibilities for natural recovery.  
39 Wolf Haven International, Tenino, Washington.
- 40 Person, D. K. and A. L. Russell. 2009. Reproduction and den site selection by wolves in a disturbed  
41 landscape. *Northwest Science* 83:211-224.
- 42 Person, D. K., M. Kirchhoff, V. Van Ballenberghe, G. C. Iverson, and E. Grossman. 1996. The  
43 Alexander Archipelago wolf: a conservation assessment. General Technical Report PNW-  
44 GTR-384, Pacific Northwest Research Station, USDA Forest Service, Portland, Oregon.
- 45 Peterson, R. O. and P. Ciucci. 2003. The wolf as a carnivore. Pages 104-130 *in* L. D. Mech and L.  
46 Boitani, editors. *Wolves: behavior, ecology, and conservation*. University of Chicago Press,  
47 Chicago, Illinois.

- 
- Peterson, R. O., N. J. Thomas, J. M. Thurber, J. A. Vucetich, and T. A. Waite. 1998. Population limitation and the wolves of Isle Royale. *Journal of Mammalogy* 79:828-841.
- Pisano, R. 1979. Does the Cascade wolf survive? *Oryx* 15:185-190.
- Pletscher, D. H., R. R. Ream, D. K. Boyd, M. W. Fairchild, and K. E. Kunkel. 1997. Population dynamics of a recolonizing wolf population. *Journal of Wildlife Management* 61:459-465.
- Potvin, M. J., T. D. Drummer, J. A. Vucetich, D. E. Beyer, Jr., R. O. Peterson, and J. H. Hammill. 2005. Monitoring and habitat analysis for wolves in upper Michigan. *Journal of Wildlife Management* 69:1660-1669.
- Proffitt, K. M., J. I. Grigg, K. L. Hamlin, and R. A. Garrott. 2009. Contrasting effects of wolves and human hunters on elk behavioral responses to predation risk. *Journal of Wildlife Management* 73:345-356.
- Prugh, L. R., C. J. Stoner, C. W. Epps, W. T. Bean, W. J. Ripple, A. S. Laliberte, and J. S. Brashares. 2009. The rise of the mesopredator. *BioScience* 59:779-791.
- Pynn, L. 2008. Wolves making comeback after century of bounties, poisoning. *Vancouver Sun* 2008(February 5).
- Rachael, J. 2010. Project W-170-R-33 progress report, elk, Study I, Job 1. Idaho Department of Fish and Game, Boise, Idaho.
- Räikkönen, J., J. A. Vucetich, R. O. Peterson, and M. P. Nelson. 2009. Congenital bone deformities and the inbred wolves (*Canis lupus*) of Isle Royale. *Biological Conservation* 142:1025-1031.
- Ratti, J. T., M. Weinstein, J. M. Scott, P. Avsharian, A.-M. Gillesberg, C. A. Miller, M. M. Szepanski, and L. K. Bomar. 1999. Feasibility study on the reintroduction of gray wolves to the Olympic Peninsula. Department of Fish and Wildlife Resources and Idaho Cooperative Research Unit, University of Idaho, Moscow, Idaho.
- Ray, C., M. Gilpin, and A. T. Smith. 1991. The effect of conspecific attraction on metapopulation dynamics. *Biological Journal of the Linnean Society* 42:123-134.
- Ray, V. F. 1933. The Sanpoil and Nespelem: Salishan peoples of northeastern Washington. University of Washington Publications in Anthropology 5:1-237.
- Ream, R. R., M. W. Fairchild, D. K. Boyd, and D. H. Pletscher. 1991. Population dynamics and home range changes in a colonizing wolf population. Pages 349-366 *in* R. B. Keiter and M. S. Boyce, editors. *The Greater Yellowstone Ecosystem: redefining America's wilderness heritage*. Yale University Press, New Haven, Connecticut.
- Reed, D. H., J. J. O'Grady, B. W. Brook, J. D. Ballou, and R. Frankham. 2003. Estimates of minimum viable population sizes for vertebrates and factors influencing those estimates. *Biological Conservation* 113:23-34.
- Rich, L. N. 2010. An assessment of factors influencing territory size and the use of hunter surveys for monitoring wolves in Montana. University of Montana, Missoula, Montana.
- Ripple, W. J. and R. L. Beschta. 2004. Wolves and the ecology of fear: can predation risk structure ecosystems? *BioScience* 54:755-766.
- Ripple, W. J. and R. L. Beschta. 2007. Restoring Yellowstone's aspen with wolves. *Biological Conservation* 138:514-519.
- Robinson, M. J. 2005. *Predatory bureaucracy: the extermination of wolves and the transformation of the West*. University Press of Colorado, Boulder, Colorado.
- Roell, B. J., D. E. Beyer, Jr., P. E. Lederle, D. H. Lonsway, and K. L. Sitar. 2010. Michigan wolf management 2009 report. Wildlife Division Report No. 3511, Michigan Department of Natural Resources & Environment, Lansing, Michigan.
- Rooney, T. P. and D. P. Anderson. 2009. Are wolf-mediated trophic cascades boosting biodiversity in the Great Lakes region? Pages 205-215 *in* A. P. Wydeven, T. R. Van Deelen, and E. J.
-

- Heske, editors. Recovery of gray wolves in the Great Lakes region of the United States: an endangered species success story. Springer, New York, New York.
- Rosenheim, J. A. 2004. Top predators constrain the habitat selection games played by intermediate predators and their prey. *Israel Journal of Zoology* 50:129-138.
- Ruid, D. B., W. J. Paul, B. J. Roell, A. P. Wydeven, R. C. Willging, R. L. Jurewicz, and D. H. Lonsway. 2009. Wolf-human conflicts and management in Minnesota, Wisconsin, and Michigan. Pages 279-295 in A. P. Wydeven, T. R. Van Deelen, and E. J. Heske, editors. Recovery of gray wolves in the Great Lakes region of the United States: an endangered species success story. Springer, New York, New York.
- Ruth, T. K. 2004a. Ghost of the Rockies: the Yellowstone cougar project. *Yellowstone Science* 12:13-24.
- Ruth, T. K. 2004b. Patterns of resource use among cougars and wolves in northwestern Montana and southeastern British Columbia. Ph.D. dissertation, University of Idaho, Moscow, Idaho.
- Ruth, T. K. and P. C. Buotte. 2007. Cougar ecology and cougar carnivore interactions in Yellowstone National Park. Hornocker Wildlife Institute/Wildlife Conservation Society, Bozeman, Montana.
- Ruth, T. K. and K. Murphy. 2010. Competition with other carnivores for prey. Pages 163-172 in M. Hornocker and S. Negri, editors. Cougar ecology and conservation. University of Chicago Press, Chicago, Illinois.
- Sacks, J. J., M. Kresnow, and B. Houston. 1996. Dog bites: how big a problem? *Injury Prevention* 2:52-54.
- Sand, H., P. Wabakken, B. Zimmermann, Ö. Johansson, H. C. Pedersen, and O. Liberg. 2008. Summer kills and predation pattern in a wolf-moose system: can we rely on winter estimates? *Oecologia* 156:53-64.
- Schaller, D. T. 1996. The ecocenter as tourist attraction: Ely and the International Wolf Center. University of Minnesota, Minneapolis, Minnesota.
- <<http://www.eduweb.com/schaller/IWCsummary.html>>
- Schanning, K. 2009. Human dimensions: public opinion research concerning wolves in the Great Lakes States of Michigan, Minnesota, and Wisconsin. Pages 251-265 in A. P. Wydeven, T. R. Van Deelen, and E. J. Heske, editors. Recovery of gray wolves in the Great Lakes region of the United States: an endangered species success story. Springer, New York, New York.
- Scheffer, V. B. 1995. Mammals of the Olympic National Park and vicinity (1949). *Northwest Fauna* 2:5-133.
- Schilowsky, R. 2009. 2009 big game hunting season recommendation summary. Wyoming Game and Fish Commission, Cheyenne, Wyoming.
- Schumaker, N. H. 1998. A user's guide to the PATCH model. EPA/600/R-98/135, U.S. Environmental Protection Agency, Corvallis, Oregon.
- Scott, B. M. V. and D. M. Shackleton. 1980. Food habits of two Vancouver Island wolf packs: a preliminary study. *Canadian Journal of Zoology* 58:1203-1207.
- Servheen, C. and R. R. Knight. 1993. Possible effects of a restored gray wolf population on grizzly bears in the Greater Yellowstone Area. Pages 28-37 in R. S. Cook, editor. Ecological issues on reintroducing wolves into Yellowstone National Park. U.S. National Park Service Scientific Monograph Series NPS/NRYELL/NRSM-93-22.
- Seton, E. T. 1929. Lives of game animals. Volume 1. Cats, wolves, and foxes. Doubleday, Doran and Co., New York.
- Sheperd, J. and D. L. Base. 2010. Moose status and trend report: Region 1, GMUs 101, 105, 108, 111, 113, 117, 121, 124 W. Pages 163-167 in Washington Department of Fish and Wildlife.

- 
- 2010 game status and trend report. Washington Department of Fish and Wildlife, Olympia, Washington. 279 pp.
- Shivik, J. A. 2006. Tools for the edge: what's new for conserving carnivores. *BioScience* 56:253-259.
- Shoshone and Arapaho Tribal Fish and Game Department. 2007. Wolf management plan for the Wind River Reservation. Shoshone and Arapaho Tribal Fish and Game Department, Ethete, Wyoming. <<http://www.fws.gov/mountain-prairie/species/mammals/wolf/>>
- Sime, C. A., E. Bangs, E. Bradley, J. E. Steuber, K. Glazier, P. J. Hoover, V. Asher, K. Laudon, M. Ross, and J. Trapp. 2007. Gray wolves and livestock in Montana: a recent history of damage management. *Proceedings of the Wildlife Damage Management Conference* 12:16-35.
- Sinclair, A. R. E. and R. P. Pech. 1996. Density dependence, stochasticity, compensation and predator regulation. *Oikos* 75:164-173.
- Singleton, P. H., W. L. Gaines, and J. F. Lehmkuhl. 2002. Landscape permeability for large carnivores in Washington: a geographic information system weighted-distance and least-cost corridor assessment. Research Paper PNW-RP-549, Pacific Northwest Research Station, USDA Forest Service, Portland, Oregon.
- Skogland, T. 1991. What are the effects of predators on large ungulate populations? *Oikos* 61:401-411.
- Smith, D. W. 1998. Yellowstone wolf project: annual report, 1997. YCR-NR-98-2, National Park Service, Yellowstone Center for Resources, Yellowstone National Park, Wyoming.
- Smith, D. W. and E. Almberg. 2007. Wolf diseases in Yellowstone National Park. *Yellowstone Science* 15(2):17-19.
- Smith, D. W. and G. Ferguson. 2005. The decade of the wolf: returning the wild to Yellowstone. Lyons Press, Guilford, Connecticut.
- Smith, D. W., E. E. Bangs, J. K. Oakleaf, C. Mack, J. Fontaine, D. Boyd, M. Jimenez, D. H. Pletscher, C. C. Niemeyer, T. J. Meier, D. R. Stahler, J. Holyan, V. J. Asher, and D. L. Murray. 2010. Survival of colonizing wolves in the northern Rocky Mountains of the United States, 1982-2004. *Journal of Wildlife Management* 74:620-634.
- Smith, D. W., T. D. Drummer, K. M. Murphy, D. S. Guernsey, and S. B. Evans. 2004. Winter prey selection and estimation of wolf kill rates in Yellowstone National Park, 1995-2000. *Journal of Wildlife Management* 68:153-166.
- Smith, D. W., K. M. Murphy, and D. S. Guernsey. 2000. Yellowstone wolf project: annual report, 1999. YCR-NR-2000-01, National Park Service, Yellowstone Center for Resources, Yellowstone National Park, Wyoming.
- Smith, D. W., R. O. Peterson, and D. B. Houston. 2003. Yellowstone after wolves. *BioScience* 53:330-340.
- Smith, D. W., D. R. Stahler, E. Albers, M. Mertz, L. Williamson, N. Ehlers, K. Cassidy, J. Irving, R. Raymond, E. Almberg, and R. McIntyre. 2009. Yellowstone Wolf Project: Annual Report, 2008. National Park Service, Yellowstone Center for Resources, Yellowstone National Park, Wyoming, YCR-2009-03.
- Smith, D. W., D. R. Stahler, and D. S. Guernsey. 2006. Yellowstone Wolf project: Annual Report, 2005. National Park Service, Yellowstone Center for Resources, Yellowstone National Park, Wyoming, YCR-2006-04.
- Smith, J. L., W. A. Michaelis, K. Sloan, J. Musser, and D. J. Pierce. 1994. An analysis of elk poaching losses, and other mortality sources in Washington using biotelemetry. Federal Aid in Wildlife Restoration Project Report, Washington Department of Fish and Wildlife, Olympia, Washington. 79 pp.
-

- 
- 1 Sommers, A. P., C. C. Price, C. D. Urbigkit, and E. M. Peterson. 2010. Quantifying economic  
2 impacts of large-carnivore depredation on bovine calves. *Journal of Wildlife Management*  
3 74:1425-1434.
- 4 Soulé, M. E., D. T. Bolger, A. C. Alberts, J. Wright, M. Sorice, and S. Hill. 1988. Reconstructed  
5 dynamics of rapid extinctions of chaparral-requiring birds in urban habitat islands.  
6 *Conservation Biology* 2:75-91.
- 7 Stahler, D. R., D. W. Smith, and D. S. Guernsey. 2006. Foraging and feeding ecology of the gray  
8 wolf (*Canis lupus*): lessons from Yellowstone National Park, Wyoming, USA. *Journal of*  
9 *Nutrition* 36:1923S-1926S.
- 10 Stenglein, J. L., L. P. Waits, D. E. Ausband, P. Zager, and C. M. Mack. 2010. Efficient, noninvasive  
11 genetic sampling for monitoring reintroduced wolves. *Journal of Wildlife Management*  
12 74:1050-1058.
- 13 Stone, S. A. 2009. Compensation and non-lethal deterrent programs: building tolerance for wolf  
14 restoration in the Rockies. Pages 141-158 in M. Musiani, L. Boitani, and P. C. Paquet (editors).  
15 A new era for wolves and people: wolf recovery, human attitudes, and policy. University of  
16 Calgary Press, Calgary, Alberta.
- 17 Stone, S. A., N. Fascione, C. Miller, J. Pissot, G. Schrader, and J. Timberlake. 2008. Livestock and  
18 wolves: a guide to nonlethal tools and methods to reduce conflicts. *Defenders of Wildlife*,  
19 Washington, D.C.
- 20 Stotyn, S. A. 2008. Ecological interactions of mountain caribou, wolves and moose in the north  
21 Columbia Mountains, British Columbia. M.S. thesis, University of Alberta, Edmonton,  
22 Alberta.
- 23 Stotyn, S. A., B. N. McLellan, R. Serrouya. 2007. Mortality sources and spatial partitioning among  
24 mountain caribou, moose, and wolves in the north Columbia Mountains, British Columbia.  
25 Report prepared for the Columbia Basin Fish and Wildlife Compensation Program, Nelson,  
26 British Columbia.
- 27 Stronen, A. V., R. K. Brook, P. C. Paquet, and S. McLachlan. 2007. Farmer attitudes toward wolves:  
28 implications for the role of predators in managing disease. *Biological Conservation* 135:1-10.
- 29 Suckley, G. and J. G. Cooper. 1860. The natural history of Washington territory and Oregon, with  
30 much relating to Minnesota, Nebraska, Kansas, Utah, and California, between the thirty-sixth  
31 and forty-ninth parallels of latitude, being those parts of the final reports on the survey of the  
32 Northern Pacific Railroad route, relating to the natural history of the regions explored, with  
33 full catalogues and descriptions of the plants and animals collected from 1853 to 1860.  
34 Baillière Brothers, New York, New York.
- 35 Swenson, J.E., F. Sandegren, M. Heim, S. Brunberg, O. J. Sorensen, A. Soderberg, A. Bjarvall, R.  
36 Franzen, S. Wikan, P. Wabakken, and K. Overskaug. 1996. Er den skandinavisk bjornen farlig?  
37 NINA Oppdragsmelding 404:1-26.
- 38 Switalski, T. A. 2003. Coyote foraging ecology and vigilance in response to gray wolf reintroduction  
39 in Yellowstone National Park. *Canadian Journal of Zoology* 81:985-993.
- 40 Taylor, W. P. and W. T. Shaw. 1927. Mammals and birds of Mount Rainier National Park. National  
41 Park Service, Washington D.C.
- 42 Taylor, W. P. and W. T. Shaw. 1929. Provisional list of the land mammals of Washington.  
43 Occasional Papers of the Charles R. Conner Museum 2:1-32.
- 44 Tercek, M. T., R. Stottlemeyer, and R. Renkin. 2010. Bottom-up factors influencing riparian willow  
45 recovery in Yellowstone National Park. *Western North American Naturalist* 70:387-399.
- 46 Thiel, R. P., S. Merrill, and L. D. Mech. 1998. Tolerance by denning wolves, *Canis lupus*, to human  
47 disturbance. *Canadian Field-Naturalist* 112:340-342.
-

- 
- 1 Thompson, I. D. and R. O. Peterson. 1988. Does wolf predation alone limit the moose population  
2 in Pukaskwa Park?: a comment. *Journal of Wildlife Management* 52:556-559.
- 3 Thompson, J. G. 1993. Addressing the human dimensions of wolf reintroduction: an example using  
4 estimates of livestock depredation and costs of compensation. *Society and Natural Resources*  
5 6:165-179.
- 6 Thurber, J. M., R. O. Peterson, J. D. Woolington, and J. A. Vucetich. 1992. Coyote coexistence with  
7 wolves on the Kenai Peninsula, Alaska. *Canadian Journal of Zoology* 70:2494-2498.
- 8 Tompa, F. S. 1983. Status and management of wolves in British Columbia. Pages 20-24 in L. N.  
9 Carbyn, editor. *Wolves in Canada and Alaska: their status, biology, and management*. Canadian  
10 Wildlife Service Report Series 45:1-135.
- 11 Traill, L. W., C. J. A. Bradshaw, and B. W. Brook. 2007. Minimum viable population size: a meta-  
12 analysis of 30 years of published estimates. *Biological Conservation* 139:159-166.
- 13 Traill, L. W., B. W. Brook, R. R. Frankham, and C. J. A. Bradshaw. 2010. Pragmatic population  
14 viability targets in a rapidly changing world. *Biological Conservation* 143:28-34.
- 15 Trapp, J. R., P. Beier, C. Mack, D. R. Parsons, and P. C. Paquet. 2008. Wolf, *Canis lupus*, den site  
16 selection in the Rocky Mountains. *Canadian Field-Naturalist* 122:49-56.
- 17 Treves, A. 2008. Beyond recovery: Wisconsin's wolf policy 1980-2008. *Human Dimensions of*  
18 *Wildlife* 13:329-338.
- 19 Treves, A. and L. Naughton-Treves. 2005. Evaluating lethal control in the management of human-  
20 wildlife conflict. Pages 86-106 in R. Woodroffe, S. Thirgood, and A. Rabinowitz, editors.  
21 *People and wildlife: conflict or coexistence?* Cambridge University Press, New York.
- 22 Treves, A., R. R. Jurewicz, L. Naughton-Treves, R. A. Rose, R. C. Willging, and A. P. Wydeven.  
23 2002. Wolf depredation on domestic animals in Wisconsin, 1976-2000. *Wildlife Society*  
24 *Bulletin* 30:231-241.
- 25 Treves, A., R. L. Jurewicz, L. Naughton-Treves, and D. S. Wolcove. 2009. The price of tolerance:  
26 wolf damage payments after recovery. *Biodiversity Conservation* 18:4003-4021.
- 27 Treves, A., K. A. Martin, J. E. Wiedenhoft, and A. P. Wydeven. 2009. Dispersal of gray wolves in  
28 the Great Lakes region. Pages 191-204 in A. P. Wydeven, T. R. Van Deelen, and E. J. Heske,  
29 editors. *Recovery of gray wolves in the Great Lakes region of the United States: an endangered*  
30 *species success story*. Springer, New York, New York.
- 31 Treves, A., L. Naughton-Treves, E. K. Harper, D. J. Mladenoff, R. A. Rose, T. A. Sickley, and A. P.  
32 Wydeven. 2004. Predicting human-carnivore conflict: a spatial model derived from 25 years of  
33 data on wolf predation on livestock. *Conservation Biology* 18:114-125.
- 34 Troxell, P. S., K. A. Berg, H. Jaycox, A. L. Strauss, P. Struhsacker, and P. Callahan. 2009. Education  
35 and outreach efforts in support of wolf conservation in the Great Lakes region. Pages 297-309  
36 in A. P. Wydeven, T. R. Van Deelen, and E. J. Heske, editors. *Recovery of gray wolves in the*  
37 *Great Lakes region of the United States: an endangered species success story*. Springer, New  
38 York, New York.
- 39 Unger, D. E., P. W. Keenlance, B. E. Kohn, and E. M. Anderson. 2009. Factors influencing  
40 homesite selection by gray wolves in northwestern Wisconsin and east-central Minnesota.  
41 Pages 175-189 in A. P. Wydeven, T. R. Van Deelen, and E. J. Heske, editors. *Recovery of gray*  
42 *wolves in the Great Lakes region of the United States: an endangered species success story*.  
43 Springer, New York, New York.
- 44 United States Congress. 1929. Control of predatory animals. 70<sup>th</sup> Congress, Second session, House  
45 Document Number 497, U.S. Government Printing Office, Washington, D.C.
- 46 Unsworth, R., L. Genova, and K. Wallace. 2005. Mexican wolf Blue Range reintroduction project 5-  
47 year review: socioeconomic component. Final report, Division of Economics, U.S. Fish and

- 
- 1 Wildlife Service, Arlington, Virginia.  
2 <[http://www.fws.gov/southwest/es/mexicanwolf/pdf/MW5YRSocioeconomicsFinal200512](http://www.fws.gov/southwest/es/mexicanwolf/pdf/MW5YRSocioeconomicsFinal20051231.pdf)  
3 [31.pdf](http://www.fws.gov/southwest/es/mexicanwolf/pdf/MW5YRSocioeconomicsFinal20051231.pdf)>  
4 Urbigkit, C. and J. Urbigkit. 2010. A review: the use of livestock protection dogs in association with  
5 large carnivores in the Rocky Mountains. Sheep and Goat Research Journal 25:1-8.  
6 USCB (U.S. Census Bureau). 2007. State and county quickfacts. <<http://quickfacts.census.gov>>  
7 USFWS (U.S. Fish and Wildlife Service). 1987. Northern Rocky Mountain wolf recovery plan. U.S.  
8 Fish and Wildlife Service, Denver, Colorado.  
9 USFWS (U.S. Fish and Wildlife Service). 1994. The reintroduction of gray wolves to Yellowstone  
10 National Park and Central Idaho. Final Environmental Impact Statement. U.S. Fish and  
11 Wildlife Service, Denver, Colorado.  
12 USFWS (U.S. Fish and Wildlife Service). 2000. Proposal to reclassify and remove the gray wolf from  
13 the list of endangered and threatened wildlife in portions of the conterminous United States.  
14 Federal Register 65(135):43449-43496.  
15 USFWS (U.S. Fish and Wildlife Service). 2003. 2001 national and state economic impacts of wildlife  
16 watching: addendum to the 2001 national survey of fishing, hunting and wildlife-associated  
17 recreation. Report 2001-2, U.S. Fish and Wildlife Service, Washington, D.C.  
18 <<http://library.fws.gov/FWSOpenAccess.html>>  
19 USFWS (U.S. Fish and Wildlife Service). 2005. Mexican wolf recovery program: progress report #8.  
20 U.S. Fish and Wildlife Service, Albuquerque, New Mexico.  
21 <[http://www.fws.gov/southwest/es/mexicanwolf/pdf/Mexican\\_Wolf\\_Recovery\\_Program](http://www.fws.gov/southwest/es/mexicanwolf/pdf/Mexican_Wolf_Recovery_Program_Annual_Progress_Report_2005.pdf)  
22 [Annual\\_Progress\\_Report\\_2005.pdf](http://www.fws.gov/southwest/es/mexicanwolf/pdf/Mexican_Wolf_Recovery_Program_Annual_Progress_Report_2005.pdf)>  
23 USFWS (U.S. Fish and Wildlife Service). 2007a. Designating the northern Rocky Mountain  
24 population of gray wolf as a distinct population segment and removing this distinct population  
25 segment from the federal list of endangered and threatened wildlife. Federal Register  
26 72(26):6106-6139.  
27 USFWS (U.S. Fish and Wildlife Service). 2007b. Endangered and threatened wildlife and plants;  
28 proposed revision of special regulation for the central Idaho and Yellowstone area  
29 nonessential experimental populations of gray wolves in the northern Rocky Mountains.  
30 Federal Register 72(129):36942-36949.  
31 USFWS (U.S. Fish and Wildlife Service). 2008a. Endangered and threatened wildlife and plants; final  
32 rule designating the northern Rocky Mountain population of gray wolf as a distinct population  
33 segment and removing this distinct population segment from the federal list of endangered  
34 and threatened wildlife. Federal Register 73(39):10514-10560.  
35 USFWS (U.S. Fish and Wildlife Service). 2008b. Endangered and threatened wildlife and plants;  
36 designating the northern Rocky Mountain population of gray wolf as a distinct population  
37 segment and removing this distinct population segment from the federal list of endangered  
38 and threatened wildlife. Federal Register 73(209):63926-63932.  
39 USFWS (U.S. Fish and Wildlife Service). 2009. Endangered and threatened wildlife and plants; final  
40 rule to identify the northern Rocky Mountain population of gray wolf as a distinct population  
41 segment and to revise the list of endangered and threatened wildlife. Federal Register  
42 74(62):15123-15188.  
43 USFWS (U.S. Fish and Wildlife Service). 2010a. Endangered and threatened wildlife and plants;  
44 reinstatement of protections for the gray wolf in the northern Rocky Mountains in compliance  
45 with a court order. Federal Register 75(206):65574-65579.

- 
- 1 USFWS (U.S. Fish and Wildlife Service). 2010b. Lewis and Clark National Wildlife Refuge and Julia  
2 Butler Hansen Refuge for the Columbian White-tailed Deer draft comprehensive conservation  
3 plan and environmental impact statement. U.S. Fish and Wildlife Service, Ilwaco, Washington.
- 4 USFWS (U.S. Fish and Wildlife Service). 2011a. Endangered and threatened wildlife and plants;  
5 proposed rule to revise the list of endangered and threatened wildlife for the gray wolf (*Canis*  
6 *lupus*) in the eastern United States, initiation of status reviews for the gray wolf and for the  
7 eastern wolf (*Canis lycaon*). Federal Register 76(87):26086-26145.
- 8 USFWS (U.S. Fish and Wildlife Service). 2011b. Endangered and threatened wildlife and plants;  
9 reissuance of final rule to identify the northern Rocky Mountain population of gray wolf as a  
10 distinct population segment and to revise the list of endangered and threatened wildlife. Federal  
11 Register 76(87):25590-25592.
- 12 USFWS (U.S. Fish and Wildlife Service) and USCB (U.S. Census Bureau). 2003. 2001 national survey  
13 of fishing, hunting, and wildlife-associated recreation: Washington. FHW/01-WA Rev., U.S.  
14 Fish and Wildlife Service, Washington, D.C.  
15 <<http://www.census.gov/prod/2003pubs/01fhw/fhw01-wa.pdf>>
- 16 USFWS (U.S. Fish and Wildlife Service) and USCB (U.S. Census Bureau). 2007. 2006 national  
17 survey of fishing, hunting, and wildlife-associated recreation. FHW/06-NAT, U.S. Fish and  
18 Wildlife Service, Washington, D.C. <<http://library.fws.gov/FWSOpenAccess.html>>
- 19 USFWS (U.S. Fish and Wildlife Service) and USCB (U.S. Census Bureau). 2008. 2006 national  
20 survey of fishing, hunting, and wildlife-associated recreation: Washington. FHW/06-WA, U.S.  
21 Fish and Wildlife Service, Washington, D.C.  
22 <<http://www.census.gov/prod/2008pubs/fhw06-wa.pdf>>
- 23 USFWS (U.S. Fish and Wildlife Service), Nez Perce Tribe, National Park Service, and U.S.D.A.  
24 Wildlife Services. 2000. Rocky Mountain wolf recovery 1999 annual report. U.S. Fish and  
25 Wildlife Service, Helena, Montana. 23 pp.
- 26 USFWS (U.S. Fish and Wildlife Service), Nez Perce Tribe, National Park Service, and U.S.D.A.  
27 Wildlife Services. 2001. Rocky Mountain wolf recovery 2000 annual report. U.S. Fish and  
28 Wildlife Service, Helena, Montana. 35 pp.
- 29 USFWS (U.S. Fish and Wildlife Service), Nez Perce Tribe, National Park Service, Montana Fish,  
30 Wildlife & Parks, Idaho Fish and Game, and U.S.D.A. Wildlife Services. 2006. Rocky  
31 Mountain Wolf Recovery 2005 interagency annual report. C. A. Sime and E. E. Bangs, editors.  
32 U.S. Fish and Wildlife Service, Helena, Montana. 130 pp.
- 33 USFWS (U.S. Fish and Wildlife Service), Nez Perce Tribe, National Park Service, Montana Fish,  
34 Wildlife & Parks, Idaho Fish and Game, and U.S.D.A. Wildlife Services. 2007. Rocky  
35 Mountain wolf recovery 2006 interagency annual report. C. A. Sime and E. E. Bangs, editors.  
36 U.S. Fish and Wildlife Service, Helena, Montana. 235 pp.
- 37 USFWS (U.S. Fish and Wildlife Service), Nez Perce Tribe, National Park Service, Montana Fish,  
38 Wildlife & Parks, Blackfeet Nation, Confederated Salish and Kootenai Tribes, Idaho Fish and  
39 Game, and U.S.D.A. Wildlife Services. 2008. Rocky Mountain wolf recovery 2007 interagency  
40 annual report. C. A. Sime and E. E. Bangs, editors. U.S. Fish and Wildlife Service, Helena,  
41 Montana. 275 pp.
- 42 USFWS (U.S. Fish and Wildlife Service), Nez Perce Tribe, National Park Service, Montana Fish,  
43 Wildlife & Parks, Blackfeet Nation, Confederated Salish and Kootenai Tribes, Idaho Fish and  
44 Game, and U.S.D.A. Wildlife Services. 2009. Rocky Mountain wolf recovery 2008 interagency  
45 annual report. C. A. Sime and E. E. Bangs, editors. U.S. Fish and Wildlife Service, Helena,  
46 Montana.
-

- USFWS (U.S. Fish and Wildlife Service), Nez Perce Tribe, National Park Service, Montana Fish, Wildlife & Parks, Blackfeet Nation, Confederated Salish and Kootenai Tribes, Idaho Fish and Game, and U.S.D.A. Wildlife Services. 2010. Rocky Mountain wolf recovery 2009 interagency annual report. C. A. Sime and E. E. Bangs, editors. U.S. Fish and Wildlife Service, Helena, Montana.
- USFWS (U.S. Fish and Wildlife Service), Montana Fish, Wildlife & Parks, Nez Perce Tribe, National Park Service, Blackfeet Nation, Confederated Salish and Kootenai Tribes, Wind River Tribes, Washington Department of Wildlife, Oregon Department of Wildlife, Utah Department of Natural Resources, and U.S.D.A. Wildlife Services. 2011. Rocky Mountain wolf recovery 2010 interagency annual report. C. A. Sime and E. E. Bangs, editors. U.S. Fish and Wildlife Service, Helena, Montana.
- Van Ballenberghe, V. and W. B. Ballard. 1994. Limitation and regulation of moose populations: the role of predation. *Canadian Journal of Zoology* 72:2071-2077.
- Van Ballenberghe, V., A. W. Erickson, and D. Byman. 1975. Ecology of the timber wolf in northeastern Minnesota. *Wildlife Monographs* 43:1-43.
- van Dijk, J., L. Gustavsen, A. Mysterud, R. May, Ø. Flagstad, H. Brøseth, R. Andersen, R. Andersen, H. Steen, and A. Landa. 2008. Diet shift of a facultative scavenger, the wolverine, following recolonization of wolves. *Journal of Animal Ecology* 77:1183–1190.
- Varley, N. and M. S. Boyce. 2006. Adaptive management for reintroductions: updating a wolf recovery model for Yellowstone National Park. *Ecological Modelling* 193:315–339.
- Vilà, C., A.-K. Sundqvist, Ø. Flagstad, J. Seddon, S. Björnerfeldt, I. Kojola, A. Casulli, H. Sand, P. Wabakken, and H. Ellegren. 2003. Rescue of a severely bottlenecked wolf (*Canis lupus*) population by a single immigrant. *Proceedings of the Royal Society of London, Series B* 270:91-97.
- vonHoldt, B. M., D. R. Stahler, E. E. Bangs, D. W. Smith, M. D. Jimenez, C. M. Mack, C. C. Niemeyer, J. P. Pollinger, and R. K. Wayne. 2010. A novel assessment of population structure and gene flow in grey wolf populations of the northern Rocky Mountains of the United States. *Molecular Ecology* 19:4412-4427.
- vonHoldt, B. M., D. R. Stahler, D. W. Smith, D. A. Earl, J. P. Pollinger, and R. K. Wayne. 2008. The genealogy and genetic viability of reintroduced Yellowstone gray wolves. *Molecular Ecology* 17:252-274.
- Vucetich, J. A. and R. O. Peterson. 2009. Wolf and moose dynamics on Isle Royale. Pages 35-48 in A. P. Wydeven, T. R. Van Deelen, and E. J. Heske, editors. *Recovery of gray wolves in the Great Lakes region of the United States: an endangered species success story*. Springer, New York, New York.
- Vucetich, J. A., D. W. Smith, and D. R. Stauber. 2005. Influence of harvest, climate and wolf predation on Yellowstone elk, 1961-2004. *Oikos* 111:259-270.
- Vynne, S. J. 2009. Livestock compensation for the Mexican gray wolf: improving tolerance or increasing tension? *Human Dimensions of Wildlife* 14:456-457.
- Watts, D. E., L. G. Butler, B. W. Dale, and R. D. Cox. 2010. The Ilnik wolf *Canis lupus* pack: use of marine mammals and offshore sea ice. *Wildlife Biology* 16:144-149.
- Wayne, R. K. and C. Vilà. 2003. Molecular genetic studies of wolves. Pages 218-238 in L. D. Mech and L. Boitani, editors. *Wolves: behavior, ecology, and conservation*. University of Chicago Press, Chicago, Illinois.
- WDFW (Washington Department of Fish and Wildlife). 1997-2006. Game harvest reports. Washington Department of Fish and Wildlife, Olympia, Washington.
- <<http://wdfw.wa.gov/hunting/harvest/>>

- 
- 1 WDFW (Washington Department of Fish and Wildlife). 2001a. Draft Selkirk elk herd. Washington  
2 Department of Fish and Wildlife, Olympia, Washington. 47 pp.
- 3 WDFW (Washington Department of Fish and Wildlife). 2001b. Blue Mountains elk herd.  
4 Washington Department of Fish and Wildlife, Olympia, Washington. 47 pp.
- 5 WDFW (Washington Department of Fish and Wildlife). 2002a. Yakima elk herd. Washington  
6 Department of Fish and Wildlife, Olympia, Washington. 69 pp.
- 7 WDFW (Washington Department of Fish and Wildlife). 2002b. North Cascade (Nooksack) elk  
8 herd. Washington Department of Fish and Wildlife, Olympia, Washington. 54 pp.
- 9 WDFW (Washington Department of Fish and Wildlife). 2002c. North Rainier elk herd. Washington  
10 Department of Fish and Wildlife, Olympia, Washington. 63 pp.
- 11 WDFW (Washington Department of Fish and Wildlife). 2002d. South Rainier elk herd. Washington  
12 Department of Fish and Wildlife, Olympia, Washington. 32 pp.
- 13 WDFW (Washington Department of Fish and Wildlife). 2005a. Washington's Comprehensive  
14 Wildlife Conservation Strategy. Washington Department of Fish and Wildlife, Olympia,  
15 Washington.
- 16 WDFW (Washington Department of Fish and Wildlife). 2005b. Olympic elk herd. Washington  
17 Department of Fish and Wildlife, Olympia, Washington. 52 pp.
- 18 WDFW (Washington Department of Fish and Wildlife). 2006a. Colockum elk herd. Washington  
19 Department of Fish and Wildlife, Olympia, Washington. 48 pp.
- 20 WDFW (Washington Department of Fish and Wildlife). 2006b. Mount St. Helens elk herd.  
21 Washington Department of Fish and Wildlife, Olympia, Washington. 52 pp.
- 22 WDFW (Washington Department of Fish and Wildlife). 2006c. 2006 game status and trend report.  
23 Washington Department of Fish and Wildlife, Olympia, Washington. 257 pp.
- 24 WDFW (Washington Department of Fish and Wildlife). 2007. 2007 game status and trend report.  
25 Washington Department of Fish and Wildlife, Olympia, Washington. 282 pp.
- 26 WDFW (Washington Department of Fish and Wildlife). 2008. 2009-2015 game management plan,  
27 July 2009-June 2015. Washington Department of Fish and Wildlife, Olympia, Washington. 136  
28 pp.
- 29 WDFW (Washington Department of Fish and Wildlife). 2010a. Washington state deer management  
30 plan: white-tailed deer. Washington Department of Fish and Wildlife, Olympia, Washington.  
31 124 pp.
- 32 WDFW (Washington Department of Fish and Wildlife). 2010b. 2010 game status and trend report.  
33 Washington Department of Fish and Wildlife, Olympia, Washington. 279 pp.
- 34 WDFW (Washington Department of Fish and Wildlife). 2010c. Cougar outreach and education in  
35 Washington state. Washington Department of Fish and Wildlife, Olympia, Washington. 110  
36 pp.
- 37 WDNR (Wisconsin Department of Natural Resources). 1999. Wisconsin wolf management plan.  
38 Wisconsin Department of Natural Resources, Madison, Wisconsin.
- 39 Webster, E. B. 1920. The king of the Olympics: Roosevelt elk and other mammals of the Olympic  
40 Mountains. Port Angeles, Washington.
- 41 WFPA (Washington Forest Products Association). 2007. Forest facts & figures. Washington Forest  
42 Products Association, Olympia, Washington. <<http://www.wfpa.org/forest-facts/>>
- 43 WGFC (Wyoming Game and Fish Commission). 2008. Final Wyoming gray wolf management plan.  
44 Wyoming Game and Fish Commission, Cheyenne, Wyoming.
- 45 WHCWG (Washington Wildlife Habitat Connectivity Working Group). 2010. Washington  
46 Connected Landscapes Project: Statewide analysis. Washington Department of Fish and  
47 Wildlife, and Transportation, Olympia, Washington.
-

- 
- 1 White, P. A., and D. K. Boyd. 1989. A cougar (*Felis concolor*) kitten killed and eaten by gray wolves  
2 (*Canis lupus*) in Glacier National Park, Montana. Canadian Field-Naturalist 103:408-409.
- 3 White, P. J. and R. A. Garrott. 2005. Yellowstone's ungulates after wolves – expectations,  
4 realizations, and predictions. Biological Conservation 125:141-152.
- 5 White, P. J., R. A. Garrott, and L. L. Eberhardt. 2003. Evaluating the consequences of wolf recovery  
6 on northern Yellowstone elk. YCR-NR-2004-02, U.S. National Park Service, Yellowstone  
7 National Park, Wyoming.
- 8 White, P. J., R. A. Garrott, K. L. Hamlin, R. C. Cook, J. G. Cook, and J. A. Cunningham. 2011.  
9 Body condition and pregnancy in northern Yellowstone elk: evidence for predation risk  
10 effects? Ecological Applications 21:3-8.
- 11 White, P. J., T. O. Lemke, D. B. Tyers, and J. A. Fuller. 2008. Initial effects of reintroduced wolves  
12 *Canis lupus* on bighorn sheep *Ovis canadensis* dynamics in Yellowstone National Park. Wildlife  
13 Biology 14:138-146.
- 14 White, P. J., D. W. Smith, J. W. Duffield, M. Jimenez, T. McEneaney, and G. Plumb. 2005.  
15 Yellowstone after wolves: environmental statement predictions and ten-year appraisals.  
16 Yellowstone Science 13(1):34-41.
- 17 Wicker, K. J. 1996. An analysis of public testimonies on the reintroduction of wolves to the Greater  
18 Yellowstone ecosystem. M.S. thesis, Texas A&M University, College Station, Texas.
- 19 Wild, M. A., N. T. Hobbs, M. S. Graham, and M. W. Miller. 2011. The role of predation in disease  
20 control: a comparison of selective and nonselective removal on prion disease dynamics in deer.  
21 Journal of Wildlife Diseases 47:78-93.
- 22 Wild, M. A., M. W. Miller, and N. T. Hobbs. 2005. Could wolves control chronic wasting disease?  
23 Second International Chronic Wasting Disease Symposium, Madison Wisconsin.  
24 <<http://www.cwd-info.org/index.php/fuseaction/resources.meetingsSymposia>>
- 25 Wilkes, C. 1844. Narrative of the United States exploring expedition during the years 1838, 1839,  
26 1840, 1841, 1842. Vol. IV. C. Sherman, Philadelphia, Pennsylvania.
- 27 Wilmers, C. C., R. L. Crabtree, D. W. Smith, K. M. Murphy, and W. M. Getz. 2003a. Trophic  
28 facilitation by introduced top predators: grey wolf subsidies to scavengers in Yellowstone  
29 National Park. Journal of Animal Ecology 72:909-916.
- 30 Wilmers, C. C., D. R. Stahler, R. L. Crabtree, D. W. Smith, and W. M. Getz. 2003b. Resource  
31 dispersion and consumer dominance: scavenging at wolf- and hunter-killed carcasses in  
32 Greater Yellowstone, USA. Ecology Letters 6:996-1003.
- 33 Wilmot, J. and T. W. Clark. 2005. Wolf restoration: a battle in the war over the West. Pages 138-173  
34 in T. W. Clark, M. B. Rutherford, and D. Casey, editors. Coexisting with large carnivores:  
35 lessons from Greater Yellowstone. Island Press, Washington, D.C.
- 36 Winnie, J. A., Jr. and S. Creel. 2007. Sex-specific behavioral responses of elk to spatial and temporal  
37 variation in the threat of wolf predation. Animal Behavior 73:215-225.
- 38 Wittmer, H. U., B. N. McLellan, D. R. Seip, J. A. Young, T. A. Kinley, G. S. Watts, and D.  
39 Hamilton. 2005. Population dynamics of the endangered mountain ecotype of woodland  
40 caribou (*Rangifer tarandus caribou*) in British Columbia, Canada. Canadian Journal of Zoology  
41 83:407-418.
- 42 WSDOR (Washington State Department of Revenue). 2007. Harvest statistics. Washington State  
43 Department of Revenue, Olympia, Washington.  
44 <[http://dor.wa.gov/content/FindTaxesAndRates/OtherTaxes/Timber/forst\\_stat.aspx](http://dor.wa.gov/content/FindTaxesAndRates/OtherTaxes/Timber/forst_stat.aspx)>
- 45 WSDOT (Washington State Department of Transportation). 2008. Unemployment rates by county  
46 in Washington State, 2006. Washington State Department of Transportation, Olympia,  
47 Washington.
-

- 
- 1 Wydeven, A. P., R. L. Jurewicz, T. R. Van Deelen, J. Erb, J. H. Hammill, D. E. Beyer, Jr., B. Roell, J.  
2 E. Wiedenhoeft, and D. A. Weitz. 2009b. Gray wolf conservation in the Great Lakes region of  
3 the United States. Pages 69-93 *in* M. Musiani, L. Boitani, and P. C. Paquet, editors. A new era  
4 for wolves and people: wolf recovery, human attitudes, and policy. University of Calgary Press,  
5 Calgary, Alberta.
- 6 Wydeven, A. P., R. N. Schultz, and R. P. Thiel. 1995. Monitoring of a recovering gray wolf  
7 population in Wisconsin, 1979-1991. Pages 147-156 *in* L. N. Carbyn, S. H. Fritts, and D. R.  
8 Seip, editors. Ecology and conservation of wolves in a changing world. Canadian Circumpolar  
9 Institute, Edmonton.
- 10 Wydeven, A. P., A. Treves, B. Brost, and J. E. Wiedenhoeft. 2004. Characteristics of wolf packs in  
11 Wisconsin: Identification of traits influencing depredation. Pages 28-50 *in* N. Fascione, A.  
12 Delach, and M. E. Smith, editors. People and predators: from conflict to coexistence. Island  
13 Press, Washington, D.C.
- 14 Wydeven, A. P., T. R. Van Deelen, and E. J. Heske. 2009c. Wolf recovery in the Great Lakes region:  
15 what have we learned and where will we go now? Pages 331-337 *in* A. P. Wydeven, T. R. Van  
16 Deelen, and E. J. Heske, editors. Recovery of gray wolves in the Great Lakes region of the  
17 United States: an endangered species success story. Springer, New York, New York.
- 18 Wydeven, A. P., J. E. Wiedenhoeft, R. N. Schultz, and R. P. Thiel. 2008. Progress report of wolf  
19 population monitoring in Wisconsin for the period April-September 2007 & annual summaries  
20 for 2007. PUB-ER-633I 2008, Wisconsin Department of Natural Resources, Park Falls,  
21 Wisconsin.
- 22 Wydeven, A. P., J. E. Wiedenhoeft, R. N. Schultz, and R. P. Thiel. 2009d. Progress report of wolf  
23 population monitoring in Wisconsin for the period April-September 2008 & annual summaries  
24 for 2008. PUB-ER-634K 2009, Wisconsin Department of Natural Resources, Park Falls,  
25 Wisconsin.
- 26 Wydeven, A. P., J. E. Wiedenhoeft, R. N. Schultz, R. P. Thiel, and S. Boles. 2010. Status of the  
27 timber wolf in Wisconsin, performance report 1 July 2009 through 30 June 2010. Wisconsin  
28 Endangered Resources Report #139, Wisconsin Department of Natural Resources, Madison,  
29 Wisconsin.
- 30 Wydeven, A. P., J. E. Wiedenhoeft, R. N. Schultz, R. P. Thiel, R. L. Jurewicz, B. E. Kohn, and T. R.  
31 Van Deelen. 2009a. History, population growth, and management of wolves in Wisconsin.  
32 Pages 87-105 *in* A. P. Wydeven, T. R. Van Deelen, and E. J. Heske, editors. Recovery of gray  
33 wolves in the Great Lakes region of the United States: an endangered species success story.  
34 Springer, New York, New York.
- 35 Wydeven, A. P., J. E. Wiedenhoeft, R. P. Thiel, R. N. Schultz, and S. R. Boles. 2009e. Progress  
36 report of wolf population monitoring in Wisconsin for the period October 2008-March 2009.  
37 PUB-ER-635L 2009, Wisconsin Department of Natural Resources Park Falls, Wisconsin.
- 38 Young, S. P. 1946. The wolf in North American history. Caxton Printers, Caldwell, Idaho.
- 39 Young, S. P. and E. A. Goldman. 1944. The wolves of North America. American Wildlife Institute,  
40 Washington, D.C.
- 41 Zender, S. and D. L. Base. 2006. Elk status and trend report: Region 1, Selkirk herd, GMUs 101,  
42 105, 108, 111, 113, 117, 121, 124. Pages 68-70 *in* Washington Department of Fish and Wildlife.  
43 2006 game status and trend report. Washington Department of Fish and Wildlife, Olympia,  
44 Washington. 257 pp.
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## GLOSSARY OF TERMS

For the purposes of this conservation and management plan, the following definitions apply:

**At-risk ungulate population** – any federal or state listed ungulate population (e.g., Selkirk Mountain woodland caribou, Columbian white-tailed deer), or any ungulate population for which it is determined to have declined 25% or more below management objectives for three or more years and population trend analysis predicts a continued decline. For populations for which numeric estimates and/or management objectives are not currently available, it will not be possible to use a specific threshold to assess a need for management action. Instead WDFW will use other sources of information related to the population, such as harvest trends, hunter effort trends, sex and age ratios, and others.

**Breeding pair** – see Successful Breeding Pair.

**Classify** – to list or delist wildlife species to or from endangered, or to or from the protected wildlife subcategories threatened or sensitive.

**Compensation** – monetary payment to offset or replace the economic loss for a death or injury to livestock or guarding animals due to wolf activity.

**Confirmed non-wild wolf depredation** – any depredation where there is clear physical evidence that the predator was another species (e.g., coyote, black bear, cougar, bobcat, domestic dog), or a wolf hybrid, or pet wolf, as determined by USDA Wildlife Services, WDFW, or an authorized agency representative.

**Confirmed wolf depredation** – any depredation where there is reasonable physical evidence that the dead or injured livestock was actually attacked or killed by a wolf. Primary confirmation would ordinarily be the presence of bite marks and associated subcutaneous hemorrhaging and tissue damage, indicating that the attack occurred while the victim was alive, as opposed to simply feeding on an already dead animal. Spacing between canine tooth punctures, feeding pattern on the carcass, fresh tracks, scat, hairs rubbed off on fences or brush, and/or eyewitness accounts of the attack may help identify the specific species or individual responsible for the depredation. Predation might also be confirmed in the absence of bite marks and associated hemorrhaging (i.e., if much of the carcass has already been consumed by the predator or scavengers) if there is other physical evidence to confirm predation on the live animal. This might include blood spilled or sprayed at a nearby attack site or other evidence of an attack or struggle. There may also be nearby remains of other victims for which there is still sufficient evidence to confirm predation, allowing reasonable inference of confirmed predation on an animal that has been largely consumed. Determination will be made by WDFW or other authorized personnel.

**Current market value** – the value of livestock at the time it would have normally gone to market.

**Delist** – to change the classification of endangered, threatened, or sensitive species to a classification other than endangered, threatened, or sensitive.

**Depredation** – any death or injury of livestock, as defined in this plan, caused by a predator.

1 **Dispersal** – generally refers to the natural movement of an animal from one area to another.

2  
3 **Distinct population segment** – a discrete and significant subgroup within a species that is treated  
4 as a species for purposes of listing under the federal Endangered Species Act.

5  
6 **Downlist** – to change the classification of an endangered or threatened species to a lower  
7 classification (e.g., from endangered to threatened, or from threatened to sensitive).

8  
9 **Elk herd** – defined as a population within a recognized boundary as described by a combination of  
10 Game Management Units established by WDFW. Ten defined elk herds occur in the state.

11  
12 **Endangered** – as defined by Washington law, any wildlife species native to the state of Washington  
13 that is seriously threatened with extinction throughout all or a significant portion of its range within  
14 the state.

15  
16 **Extinct** – a wildlife species that no longer exists anywhere; it has died out entirely, leaving no living  
17 representatives.

18  
19 **Extirpated** – a wildlife species that no longer occurs in the wild in Washington, but exists  
20 elsewhere.

21  
22 **Fladry** – a method of non-lethal wolf deterrent that involves attaching numerous strips of flagging  
23 material along a fence or other device for the purpose of keeping wolves out of an area occupied by  
24 livestock.

25  
26 **Game animal** – a wildlife species that can only be hunted as authorized by the Washington Fish  
27 and Wildlife Commission.

28  
29 **Guarding animals** - any dog, llama, or other species actively used to defend livestock from  
30 predators.

31  
32 **Guarding dog** – any dog actively used to defend livestock from predators.

33  
34 **Habituation** – for wolves, this refers to individuals that have lost their natural fear of humans and  
35 human activities, which allows them to live in proximity to humans. This often occurs through  
36 repeated exposure to humans in non-threatening situations, especially where food has been made  
37 available.

38  
39 **Herd dog** – any dog actively used to herd livestock.

40  
41 **Heterozygosity** – refers to the desirable condition of maintaining genetic variation in populations  
42 through the retention of two different alleles at loci on chromosomes.

43  
44 **Hybrid** – the offspring of a mating between a wolf and a dog, a wolf and a hybrid, a dog and a  
45 hybrid, or two hybrids.

46  
47 **In the act of attacking** – actively biting, wounding, or killing.

1 **Intraspecific** – occurring within a species or involving members of one species.

2  
3 **Lethal control** – management actions that result in the death of a wolf.

4  
5 **List** – to change the classification status of a wildlife species to endangered, threatened, or sensitive.

6  
7 **Livestock** – cattle, pigs, horses, mules, sheep, llamas, goats, guarding animals, and herding dogs.

8  
9 **Metapopulation** – a set of partially isolated populations of the same species. The populations are  
10 able to exchange individuals and recolonize sites in which the species has recently become  
11 extirpated.

12  
13 **Native** – any wildlife species naturally occurring in Washington for the purposes of breeding,  
14 resting, or foraging, excluding introduced species not found historically in the state. Native species  
15 are presumed to have been present in the state prior to the arrival of Euro-Americans.

16  
17 **Non-depredation** – there is clear evidence that livestock died from or was injured by a cause other  
18 than predation, such as disease, inclement weather, or poisonous plants. This determination may be  
19 made even in instances where the carcass was subsequently scavenged by wolves. It will be made by  
20 WDFW or other authorized personnel.

21  
22 **Nongame animal** – any species of fish or wildlife that is not hunted, fished, or trapped.

23  
24 **Non-lethal control** – management actions designed to frighten or threaten wolves, but that do not  
25 result in the death of a wolf.

26  
27 **Pack of wolves** – a group of wolves, usually consisting of a male, female, and their offspring from  
28 one or more generations. For purposes of monitoring, a pack is defined as a group of two or more  
29 wolves traveling together in winter.

30  
31 **Proactive management** – non-lethal husbandry methods implemented to minimize the potential  
32 for wolf-livestock conflicts. These may include, for example, modified husbandry methods, light  
33 and noise scare devices, non-lethal munitions, fencing, fladry, guarding animals, and greater use of  
34 herders/riders.

35  
36 **Probable wolf depredation** – there is sufficient evidence to suggest that the cause of death was  
37 depredation, but not enough to clearly confirm that the depredation was caused by a wolf. A  
38 number of other factors will help in reaching a conclusion, such as (1) any recently confirmed  
39 predation by wolves in the same or nearby area, and (2) any evidence (e.g., telemetry monitoring  
40 data, sightings, howling, fresh tracks, etc.) to suggest that wolves may have been in the area when the  
41 depredation occurred. All of these factors and possibly others would be considered in the  
42 investigator's best professional judgment. Determination will be made by WDFW or other  
43 authorized personnel.

44  
45 **Reintroduction** – capturing and moving animals from one area to another, usually for the purpose  
46 of reestablishing a new population in an area that was formerly occupied. For this plan,  
47 reintroduction means moving wolves from locations outside of Washington to a site(s) inside

Washington. Reintroduction is not being proposed for Washington.

**Rendezvous site** – a specific resting and gathering area occupied by wolf packs during summer and early fall after the natal den has been abandoned. A wolf pack will usually move from the natal den site to the first rendezvous site when the pups are 6-10 weeks of age (late May-early July). The first rendezvous site is usually within 1-6 miles of the natal den site. A succession of rendezvous sites are used by the pack until the pups are mature enough to travel with the adults (usually September or early October).

**Sensitive** – as defined by Washington law, any wildlife species native to the state of Washington that is vulnerable or declining and is likely to become endangered or threatened in a significant portion of its range within the state without cooperative management or removal of threats.

**Significant portion of its range** – that portion of a species' range likely to be essential to the long-term survival of the population in Washington.

**Sink population** – a subpopulation where mortality exceeds reproductive success and therefore has difficulty sustaining itself without continual immigration. Sink populations are generally found in lower quality habitats known as sink habitats.

**Source population** – a subpopulation whose reproductive success exceeds mortality and therefore produces young that emigrate to other subpopulations and unoccupied areas. Source populations are generally found in better quality habitats known as source habitats.

**Species** – as defined by Washington law, any group of animals classified as a species or subspecies as commonly accepted by the scientific community.

**Successful breeding pair** – an adult male and an adult female wolf with at least two pups surviving to December 31 of a given year, as documented under WDFW's established protocols.

**Threatened** – as defined by Washington law, any wildlife species native to the state of Washington that is likely to become an endangered species within the foreseeable future throughout a significant portion of its range within the state without cooperative management or removal of threats.

**Translocation** – moving animals from one area to another for the purpose of establishing a new population.

**Turbofladry** – a method of non-lethal wolf deterrent that involves attaching numerous strips of flagging material along an electrified fence for the purpose of keeping wolves out of an area occupied by livestock.

**Unconfirmed cause of death** – any depredation where there is no clear evidence as to what caused the death of the animal, as determined by WDFW or other authorized personnel.

**Unconfirmed depredation** – any depredation where the predator responsible cannot be determined by WDFW or other authorized personnel.

1 **Ungulate** – any wild species of hoofed mammal, including deer, elk, moose, bighorn sheep,  
2 mountain goat, and caribou. Cattle, sheep, pigs, horses, and llamas are also ungulates, but are  
3 referred to as domestic livestock in this plan.  
4

5 **Unknown loss** – with respect to compensation, the loss of livestock from an area with known wolf  
6 activity without a carcass as evidence. This would be based on historical records of livestock return  
7 rates prior to wolf presence/wolf depredation in the area.  
8

9 **Viable population** – one that is able to maintain its size, distribution, and genetic variation over  
10 time without significant intervention requiring human conservation actions.  
11

12 **Wildlife** – as defined by Washington law, “wildlife” means all species of the animal kingdom whose  
13 members exist in Washington in a wild state. This includes but is not limited to mammals, birds,  
14 reptiles, amphibians, fish, and invertebrates. The term “wildlife” does not include feral domestic  
15 mammals, old world rats and mice of the family Muridae of the order Rodentia, or those fish,  
16 shellfish, and marine invertebrates classified as food fish or shellfish by the director of WDFW. The  
17 term “wildlife” includes all stages of development and the bodily parts of wildlife members.  
18

19 **Wolf recovery/conservation region** – any of three broad designated regions in Washington where  
20 wolves need to become reestablished to meet the conservation goals of this plan. The regions are  
21 illustrated in Figure 2.  
22

Appendix A. Washington laws: Washington Administrative Code 232-12- 011. Wildlife classified as protected shall not be hunted or fished; Washington Administrative Code 232-12- 014. Wildlife classified as endangered species; Washington Administrative Code 232-12-297. Endangered, threatened and sensitive wildlife species classification; Revised Code of Washington 77.15.120. Endangered fish or wildlife – unlawful taking – penalty; and Revised Code of Washington 77.15.130. Protected fish or wildlife – unlawful taking – penalty.

#### WAC 232-12-011 Wildlife classified as protected shall not be hunted or fished.

Protected wildlife are designated into three subcategories: threatened, sensitive, and other.

(1) Threatened species are any wildlife species native to the state of Washington that are likely to become endangered within the foreseeable future throughout a significant portion of their range within the state without cooperative management or removal of threats. Protected wildlife designated as threatened include:

Common Name	Scientific Name
Mazama pocket gopher	<i>Thomomys mazama</i>
western gray squirrel	<i>Sciurus griseus</i>
Steller (northern) sea lion	<i>Eumetopias jubatus</i>
North American lynx	<i>Lynx canadensis</i>
ferruginous hawk	<i>Buteo regalis</i>
marbled murrelet	<i>Brachyramphus marmoratus</i>
green sea turtle	<i>Chelonia mydas</i>
loggerhead sea turtle	<i>Caretta caretta</i>
greater sage-grouse	<i>Centrocercus urophasianus</i>
sharp-tailed grouse	<i>Phasianus columbianus</i>

(2) Sensitive species are any wildlife species native to the state of Washington that are vulnerable or declining and are likely to become endangered or threatened in a significant portion of their range within the state without cooperative management or removal of threats. Protected wildlife designated as sensitive include:

Common Name	Scientific Name
gray whale	<i>Eschrichtius gibbosus</i>
common Loon	<i>Gavia immer</i>
peregrine falcon	<i>Falco peregrinus</i>
bald eagle	<i>Haliaeetus leucocephalus</i>
Larch Mountain salamander	<i>Plethodon larselli</i>
pygmy whitefish	<i>Prosopium coulteri</i>
marginated sculpin	<i>Cottus marginatus</i>
Olympic mudminnow	<i>Novumbra hubbsi</i>

(3) Other protected wildlife include:

Common Name	Scientific Name
coney or pika	<i>Ochotona princeps</i>
least chipmunk	<i>Tamias minimus</i>
yellow-pine chipmunk	<i>Tamias amoenus</i>
Townsend's chipmunk	<i>Tamias townsendii</i>
red-tailed chipmunk	<i>Tamias ruficaudus</i>
hoary marmot	<i>Marmota caligata</i>
Olympic marmot	<i>Marmota olympus</i>
Cascade golden-mantled ground squirrel	<i>Spermophilus saturatus</i>
golden-mantled ground squirrel	<i>Spermophilus lateralis</i>
Washington ground squirrel	<i>Spermophilus washingtoni</i>
red squirrel	<i>Tamiasciurus hudsonicus</i>
Douglas squirrel	<i>Tamiasciurus douglasii</i>
northern flying squirrel	<i>Glaucomys sabrinus</i>
Wolverine	<i>Gulo gulo</i>
painted turtle	<i>Chrysemys picta</i>
California mountain kingsnake	<i>Lampropeltis zonata</i>

All birds not classified as game birds, predatory birds or endangered species, or designated as threatened species or sensitive species; all bats, except when found in or immediately adjacent to a dwelling or other occupied building; mammals of the order Cetacea, including whales, porpoises, and mammals of the order Pinnipedia not otherwise classified as endangered species, or designated as threatened species or sensitive species. This section shall not apply to hair seals and sea lions which are threatening to damage or are damaging commercial fishing gear being utilized in a lawful manner or when said mammals are damaging or threatening to damage commercial fish being lawfully taken with commercial gear.

[Statutory Authority: RCW 77.12.047, 77.12.020. 08-03-068 (Order 08-09), § 232-12-011, filed 1/14/08, effective 2/14/08; 06-04-066 (Order 06-09), § 232-12-011, filed 1/30/06, effective 3/2/06. Statutory Authority: RCW 77.12.047, 77.12.655, 77.12.020. 02-11-069 (Order 02-98), § 232-12-011, filed 5/10/02, effective 6/10/02. Statutory Authority: RCW 77.12.047. 02-08-048 (Order 02-53), § 232-12-011, filed 3/29/02, effective 5/1/02; 00-17-106 (Order 00-149), § 232-12-011, filed 8/16/00, effective 9/16/00. Statutory Authority: RCW 77.12.040, 77.12.010, 77.12.020, 77.12.770. 00-10-001 (Order 00-47), § 232-12-011, filed 4/19/00, effective 5/20/00. Statutory Authority: RCW 77.12.040, 77.12.010, 77.12.020, 77.12.770, 77.12.780. 00-04-017 (Order 00-05), § 232-12-011, filed 1/24/00, effective 2/24/00. Statutory Authority: RCW 77.12.020. 98-23-013 (Order 98-232), § 232-12-011, filed 11/6/98, effective 12/7/98. Statutory Authority: RCW 77.12.040. 98-10-021 (Order 98-71), § 232-12-011, filed 4/22/98, effective 5/23/98. Statutory Authority: RCW 77.12.040 and 75.08.080. 98-06-031, § 232-12-011, filed 2/26/98, effective 5/1/98. Statutory Authority: RCW 77.12.020. 97-18-019 (Order 97-167), § 232-12-011, filed 8/25/97, effective 9/25/97. Statutory Authority: RCW 77.12.040, 77.12.020, 77.12.030 and 77.32.220. 97-12-048, § 232-12-011, filed 6/2/97, effective 7/3/97. Statutory Authority: RCW 77.12.020. 93-21-027 (Order 615), § 232-12-011, filed 10/14/93, effective 11/14/93; 90-11-065 (Order 441), § 232-12-011, filed 5/15/90, effective 6/15/90. Statutory Authority: RCW 77.12.040. 89-11-061 (Order 392), § 232-12-011, filed 5/18/89; 82-19-026 (Order 192), § 232-12-011, filed 9/9/82; 81-22-002 (Order 174), § 232-12-011, filed 10/22/81; 81-12-029 (Order 165), § 232-12-011, filed 6/1/81.]

**WAC 232-12-014 Wildlife classified as endangered species.** Endangered species include:

Common Name	Scientific Name
pygmy rabbit	<i>Brachylagus idahoensis</i>
Fisher	<i>Martes pennanti</i>
gray wolf	<i>Canis lupus</i>
grizzly bear	<i>Ursus arctos</i>
sea otter	<i>Enhydra lutris</i>
sei whale	<i>Balaenoptera borealis</i>
fin whale	<i>Balaenoptera physalus</i>
blue whale	<i>Balaenoptera musculus</i>
humpback whale	<i>Megaptera novaeangliae</i>
black right whale	<i>Balaena glacialis</i>
sperm whale	<i>Physeter macrocephalus</i>
killer whale	<i>Orcinus orca</i>
Columbian white-tailed deer	<i>Odocoileus virginianus leucurus</i>
woodland caribou	<i>Rangifer tarandus caribou</i>
American white pelican	<i>Pelecanus erythrorhynchos</i>
brown pelican	<i>Pelecanus occidentalis</i>
sandhill crane	<i>Grus canadensis</i>
snowy plover	<i>Charadrius alexandrinus</i>
upland sandpiper	<i>Bartramia longicauda</i>
spotted owl	<i>Strix occidentalis</i>
Streaked horned lark	<i>Eremophila alpestris strigata</i>
western pond turtle	<i>Clemmys marmorata</i>
leatherback sea turtle	<i>Dermochelys coriacea</i>
mardon skipper	<i>Polites mardon</i>
Oregon silverspot butterfly	<i>Speyeria zerene hippolyta</i>
Taylor's checkerspot	<i>Euphydryas editha taylori</i>
Oregon spotted frog	<i>Rana pretiosa</i>
northern leopard frog	<i>Rana pipiens</i>

[Statutory Authority: RCW 77.12.047, 77.12.655, 77.12.020. 06-04-066 (Order 06-09), § 232-12-014, filed 1/30/06, effective 3/2/06. Statutory Authority: RCW 77.12.047, 77.12.655, 77.12.020. 02-11-069 (Order 02-98), § 232-12-014, filed 5/10/02, effective 6/10/02. Statutory Authority: RCW 77.12.040, 77.12.010, 77.12.020, 77.12.770, 77.12.780. 00-04-017 (Order 00-05), § 232-12-014, filed 1/24/00, effective 2/24/00. Statutory Authority: RCW 77.12.020. 98-23-013 (Order 98-232), § 232-12-014, filed 11/6/98, effective 12/7/98; 97-18-019 (Order 97-167), § 232-12-014, filed 8/25/97, effective 9/25/97; 93-21-026 (Order 616), § 232-12-014, filed 10/14/93, effective 11/14/93. Statutory Authority: RCW 77.12.020(6). 88-05-032 (Order 305), § 232-12-014, filed 2/12/88. Statutory Authority: RCW 77.12.040. 82-19-026 (Order 192), § 232-12-014, filed 9/9/82; 81-22-002 (Order 174), § 232-12-014, filed 10/22/81; 81-12-029 (Order 165), § 232-12-014, filed 6/1/81.]

**WAC 232-12-297 Endangered, threatened, and sensitive wildlife species classification.**PURPOSE

- 1.1 The purpose of this rule is to identify and classify native wildlife species that have need of protection and/or management to ensure their survival as free-ranging populations in Washington and to define the process by which listing, management, recovery, and delisting of a species can be achieved. These rules are established to ensure that consistent procedures and criteria are followed when classifying wildlife as endangered, or the protected wildlife subcategories threatened or sensitive.

DEFINITIONS

For purposes of this rule, the following definitions apply:

- 2.1 "Classify" and all derivatives means to list or delist wildlife species to or from endangered, or to or from the protected wildlife subcategories threatened or sensitive.
- 2.2 "List" and all derivatives means to change the classification status of a wildlife species to endangered, threatened, or sensitive.
- 2.3 "Delist" and its derivatives means to change the classification of endangered, threatened, or sensitive species to a classification other than endangered, threatened, or sensitive.
- 2.4 "Endangered" means any wildlife species native to the state of Washington that is seriously threatened with extinction throughout all or a significant portion of its range within the state.
- 2.5 "Threatened" means any wildlife species native to the state of Washington that is likely to become an endangered species within the foreseeable future throughout a significant portion of its range within the state without cooperative management or removal of threats.
- 2.6 "Sensitive" means any wildlife species native to the state of Washington that is vulnerable or declining and is likely to become endangered or threatened in a significant portion of its range within the state without cooperative management or removal of threats.
- 2.7 "Species" means any group of animals classified as a species or subspecies as commonly accepted by the scientific community.
- 2.8 "Native" means any wildlife species naturally occurring in Washington for purposes of breeding, resting, or foraging, excluding introduced species not found historically in this state.
- 2.9 "Significant portion of its range" means that portion of a species' range likely to be essential to the long term survival of the population in Washington.

LISTING CRITERIA

- 3.1 The commission shall list a wildlife species as endangered, threatened, or sensitive solely on the basis of the biological status of the species being considered, based on the preponderance of scientific data available, except as noted in section 3.4.
- 3.2 If a species is listed as endangered or threatened under the federal Endangered Species Act, the agency will recommend to the commission that it be listed as endangered or threatened as specified in section 9.1. If listed, the agency will proceed with development of a recovery plan pursuant to section 11.1.
- 3.3 Species may be listed as endangered, threatened, or sensitive only when populations are in danger of failing, declining, or are vulnerable, due to factors including but not restricted to limited numbers, disease, predation, exploitation, or habitat loss or change, pursuant to section 7.1.
- 3.4 Where a species of the class Insecta, based on substantial evidence, is determined to present an unreasonable risk to public health, the commission may make the determination that the species need not be listed as endangered, threatened, or sensitive.

DELISTING CRITERIA

- 4.1 The commission shall delist a wildlife species from endangered, threatened, or sensitive solely on the basis of the biological status of the species being considered, based on the preponderance of scientific data available.
- 4.2 A species may be delisted from endangered, threatened, or sensitive only when populations are no longer in danger of failing, declining, are no longer vulnerable, pursuant to section 3.3, or meet recovery plan goals, and when it no longer meets the definitions in sections 2.4, 2.5, or 2.6.

INITIATION OF LISTING PROCESS

- 5.1 Any one of the following events may initiate the listing process.
- 5.1.1 The agency determines that a species population may be in danger of failing, declining, or vulnerable, pursuant to section 3.3.
- 5.1.2 A petition is received at the agency from an interested person. The petition should be addressed to the director. It should set forth specific evidence and scientific data which shows that the species may be failing, declining, or vulnerable, pursuant to section 3.3. Within 60 days, the agency shall either deny the petition, stating the reasons, or initiate the classification process.
- 5.1.3 An emergency, as defined by the Administrative Procedure Act, chapter 34.05 RCW. The listing of any species previously classified under

emergency rule shall be governed by the provisions of this section.

- 5.1.4 The commission requests the agency review a species of concern.

- 5.2 Upon initiation of the listing process the agency shall publish a public notice in the Washington Register, and notify those parties who have expressed their interest to the department, announcing the initiation of the classification process and calling for scientific information relevant to the species status report under consideration pursuant to section 7.1.

#### INITIATION OF DELISTING PROCESS

- 6.1 Any one of the following events may initiate the delisting process:

- 6.1.1 The agency determines that a species population may no longer be in danger of failing, declining, or vulnerable, pursuant to section 3.3.

- 6.1.2 The agency receives a petition from an interested person. The petition should be addressed to the director. It should set forth specific evidence and scientific data which shows that the species may no longer be failing, declining, or vulnerable, pursuant to section 3.3. Within 60 days, the agency shall either deny the petition, stating the reasons, or initiate the delisting process.

- 6.1.3 The commission requests the agency review a species of concern.

- 6.2 Upon initiation of the delisting process the agency shall publish a public notice in the Washington Register, and notify those parties who have expressed their interest to the department, announcing the initiation of the delisting process and calling for scientific information relevant to the species status report under consideration pursuant to section 7.1.

#### SPECIES STATUS REVIEW AND AGENCY RECOMMENDATIONS

- 7.1 Except in an emergency under 5.1.3 above, prior to making a classification recommendation to the commission, the agency shall prepare a preliminary species status report. The report will include a review of information relevant to the species' status in Washington and address factors affecting its status, including those given under section 3.3. The status report shall be reviewed by the public and scientific community. The status report will include, but not be limited to an analysis of:

- 7.1.1 Historic, current, and future species population trends.

- 7.1.2 Natural history, including ecological relationships (e.g., food habits, home range, habitat selection patterns).

- 7.1.3 Historic and current habitat trends.

- 7.1.4 Population demographics (e.g., survival and mortality rates, reproductive success) and their relationship to long term sustainability.

- 7.1.5 Historic and current species management activities.

- 7.2 Except in an emergency under 5.1.3 above, the agency shall prepare recommendations for species classification, based upon scientific data contained in the status report. Documents shall be prepared to determine the environmental consequences of adopting the recommendations pursuant to requirements of the State Environmental Policy Act (SEPA).

- 7.3 For the purpose of delisting, the status report will include a review of recovery plan goals.

#### PUBLIC REVIEW

- 8.1 Except in an emergency under 5.1.3 above, prior to making a recommendation to the commission, the agency shall provide an opportunity for interested parties to submit new scientific data relevant to the status report, classification recommendation, and any SEPA findings.

- 8.1.1 The agency shall allow at least 90 days for public comment.

- 8.1.2 The agency will hold at least one public meeting in each of its administrative regions during the public review period.

#### FINAL RECOMMENDATIONS AND COMMISSION ACTION

- 9.1 After the close of the public comment period, the agency shall complete a final status report and classification recommendation. SEPA documents will be prepared, as necessary, for the final agency recommendation for classification. The classification recommendation will be presented to the commission for action. The final species status report, agency classification recommendation, and SEPA documents will be made available to the public at least 30 days prior to the commission meeting.

- 9.2 Notice of the proposed commission action will be published at least 30 days prior to the commission meeting.

#### PERIODIC SPECIES STATUS REVIEW

- 10.1 The agency shall conduct a review of each endangered, threatened, or sensitive wildlife species at least every five years after the date of its listing. This review shall include an update of the species status report to determine whether the status of the species warrants its current listing status or deserves reclassification.

- 10.1.1 The agency shall notify any parties who have expressed their interest to the department of the periodic status review. This notice shall occur at

- least one year prior to end of the five year period required by section 10.1.
- 10.2 The status of all delisted species shall be reviewed at least once, five years following the date of delisting.
- 10.3 The department shall evaluate the necessity of changing the classification of the species being reviewed. The agency shall report its findings to the commission at a commission meeting. The agency shall notify the public of its findings at least 30 days prior to presenting the findings to the commission.
- 10.3.1 If the agency determines that new information suggests that classification of a species should be changed from its present state, the agency shall initiate classification procedures provided for in these rules starting with section 5.1.
- 10.3.2 If the agency determines that conditions have not changed significantly and that the classification of the species should remain unchanged, the agency shall recommend to the commission that the species being reviewed shall retain its present classification status.
- 10.4 Nothing in these rules shall be construed to automatically delist a species without formal commission action.

#### RECOVERY AND MANAGEMENT OF LISTED SPECIES

- 11.1 The agency shall write a recovery plan for species listed as endangered or threatened. The agency will write a management plan for species listed as sensitive. Recovery and management plans shall address the listing criteria described in sections 3.1 and 3.3, and shall include, but are not limited to:
- 11.1.1 Target population objectives.
- 11.1.2 Criteria for reclassification.
- 11.1.3 An implementation plan for reaching population objectives which will promote cooperative management and be sensitive to landowner needs and property rights. The plan will specify resources needed from and impacts to the department, other agencies (including federal, state, and local), tribes, landowners, and other interest groups. The plan shall consider various approaches to meeting recovery objectives including, but not limited to regulation, mitigation, acquisition, incentive, and compensation mechanisms.
- 11.1.4 Public education needs.
- 11.1.5 A species monitoring plan, which requires periodic review to allow the incorporation of new information into the status report.
- 11.2 Preparation of recovery and management plans will be initiated by the agency within one year after the date of listing.
- 11.2.1 Recovery and management plans for species listed prior to 1990 or during the five years following the adoption of these rules shall be completed within five years after the date of listing or adoption of these rules, whichever comes later. Development of recovery plans for endangered species will receive higher priority than threatened or sensitive species.
- 11.2.2 Recovery and management plans for species listed after five years following the adoption of these rules shall be completed within three years after the date of listing.
- 11.2.3 The agency will publish a notice in the Washington Register and notify any parties who have expressed interest to the department interested parties of the initiation of recovery plan development.
- 11.2.4 If the deadlines defined in sections 11.2.1 and 11.2.2 are not met the department shall notify the public and report the reasons for missing the deadline and the strategy for completing the plan at a commission meeting. The intent of this section is to recognize current department personnel resources are limiting and that development of recovery plans for some of the species may require significant involvement by interests outside of the department, and therefore take longer to complete.
- 11.3 The agency shall provide an opportunity for interested public to comment on the recovery plan and any SEPA documents.

#### CLASSIFICATION PROCEDURES REVIEW

- 12.1 The agency and an ad hoc public group with members representing a broad spectrum of interests, shall meet as needed to accomplish the following:
- 12.1.1 Monitor the progress of the development of recovery and management plans and status reviews, highlight problems, and make recommendations to the department and other interested parties to improve the effectiveness of these processes.
- 12.1.2 Review these classification procedures six years after the adoption of these rules and report its findings to the commission.

#### AUTHORITY

- 13.1 The commission has the authority to classify wildlife as endangered under RCW 77.12.020. Species classified as endangered are listed under WAC 232-12-014, as amended.
- 13.2 Threatened and sensitive species shall be classified as subcategories of protected wildlife. The commission has the authority to classify wildlife as protected under RCW 77.12.020. Species classified as protected are

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listed under WAC 232-12-011, as amended. [Statutory Authority: RCW 77.12.020. 90-11-066 (Order 442), § 232-12-297, filed 5/15/90, effective 6/15/90.]

**RCW 77.15.120 Endangered fish or wildlife – Unlawful taking – Penalty.**

(1) A person is guilty of unlawful taking of endangered fish or wildlife in the second degree if the person hunts, fishes, possesses, maliciously harasses or kills fish or wildlife, or maliciously destroys the nests or eggs of fish or wildlife and the fish or wildlife is designated by the commission as endangered, and the taking has not been authorized by rule of the commission.

(2) A person is guilty of unlawful taking of endangered fish or wildlife in the first degree if the person has been:

(a) Convicted under subsection (1) of this section or convicted of any crime under this title involving the killing, possessing, harassing, or harming of endangered fish or wildlife; and

(b) Within five years of the date of the prior conviction the person commits the act described by subsection (1) of this section.

(3)(a) Unlawful taking of endangered fish or wildlife in the second degree is a gross misdemeanor.

(b) Unlawful taking of endangered fish or wildlife in the first degree is a class C felony. The department shall revoke any licenses or tags used in connection with the crime and order the person's privileges to hunt, fish, trap, or obtain licenses under this title to be suspended for two years.

[2000 c 107 § 236; 1998 c 190 § 13.]

**RCW 77.15.130 Protected fish or wildlife — Unlawful taking — Penalty.**

(1) A person is guilty of unlawful taking of protected fish or wildlife if:

(a) The person hunts, fishes, possesses, or maliciously kills protected fish or wildlife, or the person possesses or maliciously destroys the eggs or nests of protected fish or wildlife, and the taking has not been authorized by rule of the commission; or

(b) The person violates any rule of the commission regarding the taking, harming, harassment, possession, or transport of protected fish or wildlife.

(2) Unlawful taking of protected fish or wildlife is a misdemeanor.

[1998 c 190 § 14.]

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Appendix B. WDFW Wolf Working Group members.

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Daryl Asmussen  
Cattle Rancher  
PO Box 417  
Tonasket, WA 98855

John Blankenship (replaced by Linda  
Saunders at the June 2011 meeting)  
Executive Director  
Wolf Haven International  
3111 Offut Lake Rd  
Tenino, WA 98589

Duane Cocking  
Board of Directors  
Inland Empire Chapter  
Safari Club International  
8322 N Glenarvon Ln  
Newman Lake, WA 99025

Jeff Dawson  
Director  
Stevens County Cattleman  
Cattle Producers of Washington  
449 Douglas Falls Rd  
Colville, WA 99114

Jack Field  
Executive Vice President  
Washington Cattlemen's Association  
PO Box 96  
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George Halekas  
Wildlife Biologist  
Raven Wildlife Services  
24918 N Monroe Rd  
Deer Park, WA 99006

Kim Holt  
Secretary/Treasurer  
Wolf Recovery Foundation  
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Snohomish, WA 98296

Derrick Knowles  
Outreach Coordinator  
Conservation Northwest  
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Spokane, WA 99201

Colleen McShane  
Wildlife Ecologist  
Seattle City Light  
1132 North 76th St  
Seattle, WA 98103

Ken Oliver  
Former County Commissioner  
Pend Oreille County  
32371 Le Clerc Rd N  
Ione, WA 99139

Tommy Petrie, Jr.  
President  
Pend Oreille County Sportsmens Club  
10152 LeClerc Rd  
Newport, WA 99156

Gerry Ring Erickson  
Consulting Scientist  
PO Box 1896  
Shelton, Wa 98584

John Stuhlmiller  
Director of State Affairs  
Washington Farm Bureau  
PO Box 8690  
Lacey, WA 98509

Arthur Swannack  
President  
Washington State Sheep Producers  
1201 Cree Rd  
Lamont, WA 99017

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Appendix B. Continued.

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Bob Tuck  
Principal, Eco-Northwest  
(Former Member of the Washington Fish and Wildlife Commission)  
270 Westridge Rd  
Selah, WA 98942

Greta M. Wiegand  
Outdoor Recreationist  
2142 N 192nd St  
Shoreline, WA 98133

Georg Ziegltrum  
Supervisor  
Washington Forest Protection Association  
724 Columbia St NW, Suite 250  
Olympia, WA 98501

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Appendix C. The Wolf Working Group letter from June 30, 2008, that accompanied the August 2008 peer review draft of the Wolf Conservation and Management Plan.

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## **Wolf Working Group Letter**

June 30, 2008

To the citizens of Washington,

The Washington Wolf Working Group (WWG) consists of 17 citizens appointed by Washington Department of Fish and Wildlife (WDFW) Director Jeff Koenings to advise WDFW in developing a Washington Wolf Conservation and Management Plan. WWG members represent a broad range of perspectives, from those concerned that wolf recovery would negatively affect their livelihood or interests to those who believe that wolves are a valued part of Washington's natural heritage and play a role in healthy functioning ecosystems.

The WWG made every effort to understand the complex and diverse issues surrounding wolf recovery in depth, and to carefully craft management approaches that achieve plan objectives in a way that is balanced, fair, cost effective, and that has a high probability of success. Extensive discussion by WWG members focused on how to achieve two key strongly linked objectives (described in the plan as follows):

1. Implementing conservation strategies that will result in the reestablishment of a naturally reproducing and viable wolf population distributed in a significant portion of the species' former range in Washington, and
2. Managing wolf-livestock conflicts in a way that gives livestock owners who are experiencing losses tools to minimize future losses, while at the same time not negatively impacting the recovery or long-term perpetuation of sustainable wolf populations.

Efforts by the WWG to forge a consensus were shaped by shared points of understanding, including the need to assess the entire state in terms of the strengths and weaknesses to support wolf recovery. From the wolf recovery experience in the Northern Rockies, we recognize that large contiguous blocks of public land with abundant ungulate prey not only play an important role in sustaining a viable wolf population, but are also areas with comparatively lower levels of wolf/human conflicts. WWG members share the sentiment that one region or interest group should not unfairly bear the impacts of wolf recovery. WWG members support developing a compensation program to offset livestock losses with the understanding that a high degree of accountability and verification are needed to avoid problems occurring in other state compensation programs. WWG members support taking proactive measures that would lead to faster recovery of wolves, thus allowing greater management flexibility and reducing costs over the long-term. WWG members understand that secure long-term funds will be required to implement this plan, achieve the objectives, and provide the responsiveness needed to maintain public support.

Following many hours of dedicated work and compromise, the WWG has achieved a consensus on all aspects of this draft plan, with the exception of the number of established breeding pairs needed to downlist and delist wolves in Washington (see Appendix D, Minority Report). This draft plan was developed as a "package" and it is critical to recognize that many of the components are linked and have been carefully balanced to meet multiple objectives. As a result, WWG members were

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Appendix C. Continued.

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willing to pursue innovative proactive approaches (such as promoting “within state” translocation of wolves and defining restricted circumstances where lethal take of wolves would be allowed) to achieve the conservation and management objectives in a timely assured way. Eliminating an individual component would change the overall balance of the package, adversely affect the ability to meet plan objectives, and reduce the level of collective support by the WWG.

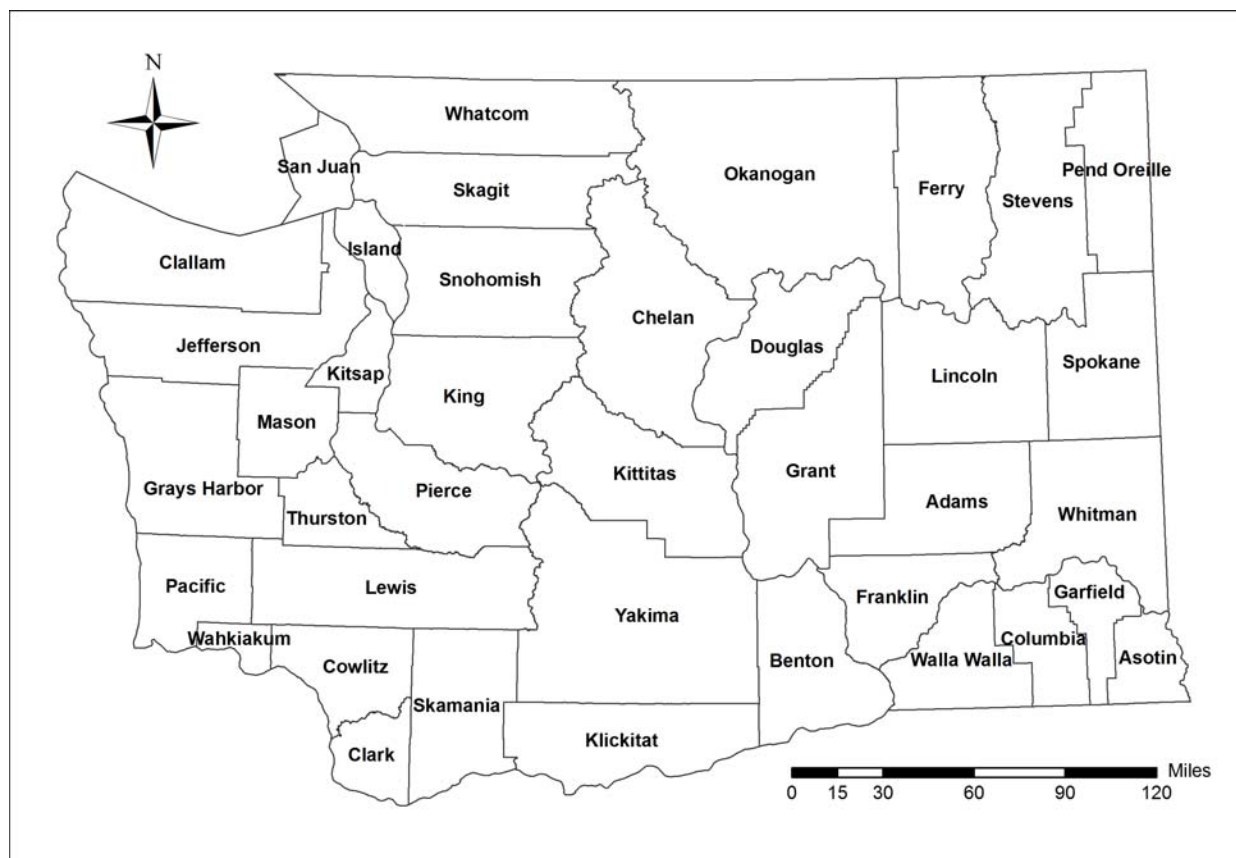
The WWG understands that this plan will be reviewed over time and that adaptive management will guide future changes in direction. Our work over the past year represents a “good faith” effort to anticipate where problems may occur in meeting plan objectives and to suggest reasonable approaches to mitigate potential problems. We recognize that public understanding of the issues surrounding wolf recovery can be hampered because of underlying misconceptions, partial truths, and fears. We have worked especially hard to accurately identify potential impacts, to frame issues within a clear and understandable context, and to be as specific as possible to conditions in Washington state.

Daryl Asmussen  
John Blankenship  
Duane Cocking  
Jeff Dawson  
Jack Field  
George Halekas  
Kim Holt  
Derrick Knowles  
Colleen McShane  
Ken Oliver  
Tommy Petrie, Jr.  
Gerry Ring Erickson  
John Stuhlmiller  
Arthur Swannack  
Bob Tuck  
Greta Wiegand  
Georg Ziegltrum

Appendix D. A list 43 reviewers submitting comments on the draft Wolf Conservation and Management Plan during the scientific peer review period conducted from August to October 2008 and the blind peer review period from October 2009 to February 2011.

Name	Affiliation	Title
Peer Review (2008)		
Dr. David Mech	University of Minnesota	Wolf Research Scientist
Dr. James Peek	University of Idaho	Emeritus Professor, Wildlife Management
Dr. Carlos Carroll	Klamath Center for Conservation Research	Research Scientist
Dr. Rich Fredrickson	University of Montana	Faculty Affiliate, Genetics
Dr. John Duffield	University of Montana	Professor, Economics
Dr. Shannon Neibergs	Washington State University	Associate Professor, Economics
Dr. Doug Smith	Yellowstone National Park	Wolf Project Lead Scientist
Ed Bangs	U.S. Fish and Wildlife Service	Federal Wolf Coordinator
John Oakleaf	U.S. Fish and Wildlife Service	Mexican Wolf Field Coordinator
Mike Jimenez	U.S. Fish and Wildlife Service	Federal Wolf Project Leader for Wyoming
Dan Trochta	U.S. Fish and Wildlife Service	Wildlife Biologist – Spokane Field Office
Carolyn Sime	Montana Fish, Wildlife and Parks	State Wolf Coordinator
Russ Morgan	Oregon Department of Fish and Wildlife	State Wolf Coordinator
Carter Niemeyer	U.S. Fish and Wildlife Service (former) and USDA Wildlife Services (former); Idaho Department of Fish and Game	Idaho Wolf Project Leader (former)
Curt Mack	Nez Perce Nation	Wolf Research Biologist
Jim Holyan	Nez Perce Nation	Wolf Research Biologist
Garth Mowat	British Columbia Ministry of Environment	Senior Wildlife Biologist
Roger Woodruff	USDA Wildlife Services (Washington)	State Director
Dr. Bill Gaines	Okanogan-Wenatchee National Forests	Forest Wildlife Ecologist and Forest Service Region 6 Wolf Lead
Mark Henjum	Umatilla National Forest	Biologist (former Oregon DFW Wolf Plan lead)
Dr. Patti Happe	Olympic National Park	Chief, Wildlife Branch
Jeanne Jerred	Colville Confederated Tribes	Chair
Francis Charles	Lower Elwha Klallam Tribe	Chair
David Vales	Muckleshoot Tribe	Wildlife Biologist
Tim Cullinan	Pt. Gamble S'Klallam Tribe	Wildlife Biologist
Jennifer Sevigny	Stillaquamish Tribe	Wildlife Biologist
Mark Nuetzmann	Yakama Nation	Wildlife Biologist
John Pierce	WDFW (Olympia)	Chief Scientist, Wildlife Research Division
Dave Ware	WDFW (Olympia)	Game Division Manager
Dr. Cliff Rice	WDFW (Olympia)	Ungulate Research Scientist
Anthony Novack	WDFW (Ellensburg)	Deer-Elk Conflict Specialist
David Anderson	WDFW (Trout Lake)	District Biologist
Dana Base	WDFW (Colville)	District Biologist
Jeff Bernatowicz	WDFW (Yakima)	District Biologist
Scott Fitkin	WDFW (Winthrop)	District Biologist
Mike Livingston	WDFW (Tri-Cities)	District Biologist
Will Moore	WDFW (Yakima)	Assistant District Biologist
Jon Gallie	WDFW (Wenatchee)	Assistant District Biologist
Chris Hammond	WDFW (Colville) (former)	Assistant District Biologist (former)
Jeff Heinlen	WDFW (Tonasket)	Assistant District Biologist
Eric Holman	WDFW (Vancouver)	Assistant District Biologist
Paul Wik	WDFW (Clarkston)	Assistant District Biologist
Ella Rowan	WDFW (Spokane)	Wildlife Biologist
Blind Peer Review (2009-2010)		
Dr. Todd Fuller	University of Massachusetts, Amherst	Professor, Wildlife Biology
3 anonymous reviewers	Unknown	Unknown

## Appendix E. A map of Washington's 39 counties.



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Appendix F. Washington laws: (1) Revised Code of Washington 77.36. Wildlife damage, and (2) Washington Administrative Code 232-36. Wildlife interaction regulations.

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**RCW 77.36 Wildlife damage.**

RCW Sections

- 77.36.010. Definitions
- 77.36.030. Trapping or killing wildlife threatening human safety or causing property damage — Limitations and conditions — Rules.
- 77.36.070. Limit on total claims from wildlife account per fiscal year.
- 77.36.080. Limit on total claims from general fund per fiscal year — Emergency exceptions.
- 77.36.100. Payment of claims for damage to commercial crops or commercial livestock — Noncash compensation — Offer of materials or services to offset or prevent wildlife interactions — Appeal of decisions.
- 77.36.110. Eligibility for compensation under this chapter — Adoption of rules.
- 77.36.120. Department's duties.
- 77.36.130. Limit on cash compensation — Burden of proof.
- 77.36.140. Chapter represents exclusive remedy.
- 77.36.150. Review of rules and policies. (Expires July 30, 2014)

77.36.010. Definitions.

The definitions in this section apply throughout this chapter unless the context clearly requires otherwise.

- (1) "Claim" means an application to the department for compensation under this chapter.
- (2) "Commercial crop" means a horticultural or agricultural product, including the growing or harvested product. For the purposes of this chapter all parts of horticultural trees shall be considered a commercial crop and shall be eligible for claims.
- (3) "Commercial livestock" means cattle, sheep, and horses held or raised by a person for sale.
- (4) "Compensation" means a cash payment, materials, or service.
- (5) "Damage" means economic losses caused by wildlife interactions.
- (6) "Immediate family member" means spouse, state registered domestic partner, brother, sister, grandparent, parent, child, or grandchild.
- (7) "Owner" means a person who has a legal right to commercial crops, commercial livestock, or other property that was damaged during a wildlife interaction.
- (8) "Wildlife interaction" means the negative interaction and the resultant damage between wildlife and commercial crops, commercial livestock, or other property.

[2009 c 521 § 184; 2009 c 333 § 54; 1996 c 54 § 2; (2001 c 274 § 2 expired June 30, 2004).]

Notes: Reviser's note: This section was amended by 2009 c 333 § 54 and by 2009 c 521 § 184, each without reference to the other. Both amendments are incorporated in the publication of this section under RCW 1.12.025(2). For rule of construction, see RCW 1.12.025(1).

Effective date -- 2009 c 333 §§ 53-66: "Sections \*53 through 66 of this act take effect July 1, 2010." [2009 c 333 § 69.]

\*Reviser's note: Section 53, chapter 333, Laws of 2009 was vetoed by the governor.

Application -- 2009 c 333 §§ 53-66: "Sections \*53 through 66 of this act apply prospectively only and not retroactively. Sections \*53 through 66 of this act apply only to claims that arise on or after July 1, 2010. Claims under chapter 77.36 RCW that arise prior to July 1, 2010, must be adjudicated under chapter 77.36 RCW as it existed prior to July 1, 2010." [2009 c 333 § 67.]

\*Reviser's note: Section 53, chapter 333, Laws of 2009 was vetoed by the governor.

Expiration date -- 2001 c 274 §§ 1-3: "The following expire June 30, 2004:

- (1) Section 1, chapter 274, Laws of 2001;
- (2) Section 2, chapter 274, Laws of 2001; and
- (3) Section 3, chapter 274, Laws of 2001." [2001 c 274 § 5.]

Effective date -- 2001 c 274: "This act is necessary for the immediate preservation of the public peace, health, or safety, or support of the state government and its existing public institutions, and takes effect July 1, 2001." [2001 c 274 § 6.]

### 77.36.030. Trapping or killing wildlife threatening human safety or causing property damage — Limitations and conditions — Rules.

(1) Subject to limitations and conditions established by the commission, the owner, the owner's immediate family member, the owner's documented employee, or a tenant of real property may trap, consistent with RCW 77.15.194, or kill wildlife that is threatening human safety or causing property damage on that property, without the licenses required under RCW 77.32.010 or authorization from the director under RCW 77.12.240.

(2) The commission shall establish the limitations and conditions of this section by rule. The rules must include:

- (a) Appropriate protection for threatened or endangered species;
- (b) Instances when verbal or written permission is required to kill wildlife;
- (c) Species that may be killed under this section; and
- (d) Requirements for the disposal of wildlife trapped or killed under this section.

(3) In establishing the limitations and conditions of this section, the commission shall take into consideration the recommendations of the Washington state wolf conservation and management plan.

[2009 c 333 § 61; 1996 c 54 § 4.]

Notes: Effective date -- Application -- 2009 c 333 §§ 53-66: See notes following RCW 77.36.010.

### 77.36.070. Limit on total claims from wildlife account per fiscal year.

The department may pay no more than one hundred twenty thousand dollars per fiscal year from the state wildlife account created in RCW 77.12.170 for claims and assessment costs for damage to commercial crops caused by wild deer or elk submitted under RCW 77.36.100.

[2009 c 333 § 59; 1996 c 54 § 8.]

Notes: Effective date -- Application -- 2009 c 333 §§ 53-66: See notes following RCW 77.36.010.

### 77.36.080. Limit on total claims from general fund per fiscal year — Emergency exceptions.

(1) Unless the legislature declares an emergency under this section, the department may pay no more than thirty thousand dollars per fiscal year from the general fund for claims and assessment costs for damage to commercial crops caused by wild deer or elk submitted under RCW 77.36.100.

(2)(a) The legislature may declare an emergency if weather, fire, or other natural events result in deer or elk causing excessive damage to commercial crops.

(b) After an emergency declaration, the department may pay as much as may be subsequently appropriated, in addition to the funds authorized under subsection (1) of this section, for claims and assessment costs under RCW 77.36.100. Such money shall be used to pay wildlife interaction claims only if the claim meets the conditions of RCW 77.36.100 and the department has expended all funds authorized under RCW 77.36.070 or subsection (1) of this section.

[2009 c 333 § 60; 1996 c 54 § 9; (2001 c 274 § 3 expired June 30, 2004).]

Notes: Effective date -- Application -- 2009 c 333 §§ 53-66: See notes following RCW 77.36.010.

Expiration date -- 2001 c 274 §§ 1-3: See note following RCW 77.36.010.

Effective date -- 2001 c 274: See note following RCW 77.36.010.

### 77.36.100. Payment of claims for damage to commercial crops or commercial livestock — Noncash compensation — Offer of materials or services to offset or prevent wildlife interactions — Appeal of decisions.

(1)(a) Except as limited by RCW 77.36.070 and 77.36.080, the department shall offer to distribute money appropriated to pay claims to the owner of commercial crops for damage caused by wild deer or elk or to the owners of commercial livestock that has been killed by bears, wolves, or cougars, or injured by bears, wolves, or cougars to such a degree that the market value of the commercial livestock has been diminished. Payments for claims for damage to commercial livestock are not subject to the limitations of RCW 77.36.070 and 77.36.080, but may not exceed the total amount specifically appropriated therefor.

(b) Owners of commercial crops or commercial livestock are only eligible for a claim under this subsection if:

(i) The owner satisfies the definition of "eligible farmer" in RCW 82.08.855;  
 (ii) The conditions of RCW 77.36.110 have been satisfied; and  
 (iii) The damage caused to the commercial crop or commercial livestock satisfies the criteria for damage established by the commission under this subsection.

(c) The commission shall adopt and maintain by rule criteria that clarifies the damage to commercial crops and commercial livestock qualifying for compensation under this subsection. An owner of a commercial crop or commercial livestock must satisfy the criteria prior to receiving compensation under this subsection. The criteria for damage adopted under this subsection must include, but not be limited to, a required minimum economic loss to the owner of the commercial crop or commercial livestock, which may not be set at a value of less than five hundred dollars.

(2)(a) The department may offer to provide noncash compensation only to offset wildlife interactions to a person who applies to the department for compensation for damage to property other than commercial crops or commercial livestock that is the result of a mammalian or avian species of wildlife on a case-specific basis if the conditions of RCW 77.36.110 have been satisfied and if the damage satisfies the criteria for damage established by the commission under this subsection.

(b) The commission shall adopt and maintain by rule criteria for damage to property other than a commercial crop or commercial livestock that is damaged by wildlife and may be eligible for compensation under this subsection, including criteria for filing a claim for compensation under this subsection.

(3)(a) To prevent or offset wildlife interactions, the department may offer materials or services to a person who applies to the department for assistance in providing mitigating actions designed to reduce wildlife interactions if the actions are designed to address damage that satisfies the criteria for damage established by the commission under this subsection.

(b) The commission shall adopt and maintain by rule criteria for mitigating actions designed to address wildlife interactions that may be eligible for materials and services under this section, including criteria for submitting an application under this section.

(4) An owner who files a claim under this section may appeal the decision of the department pursuant to rules adopted by the commission if the claim:

(a) Is denied; or

(b) Is disputed by the owner and the owner disagrees with the amount of compensation determined by the department.

[2009 c 333 § 55.]

Notes: Effective date -- Application -- 2009 c 333 §§ 53-66: See notes following RCW 77.36.010.

## 77.36.110. Eligibility for compensation under this chapter — Adoption of rules.

(1) No owner may receive compensation for wildlife interactions under this chapter unless the owner has, as determined by the department, first:

(a) Utilized applicable legal and practicable self-help preventive measures available to prevent the damage, including the use of nonlethal methods and department-provided materials and services when available under RCW 77.36.100; and

(b) Exhausted all available compensation options available from nonprofit organizations that provide compensation to private property owners due to financial losses caused by wildlife interactions.

(2) In determining if the requirements of this section have been satisfied, the department may recognize and consider the following:

(a) Property losses may occur without future or anticipated knowledge of potential problems resulting in an owner being unable to take preemptive measures.

(b) Normal agricultural practices, animal husbandry practices, recognized standard management techniques, and other industry-recognized management practices may represent adequate preventative efforts.

(c) Under certain circumstances, as determined by the department, wildlife may not logistically or practicably be managed by nonlethal efforts.

(d) Not all available legal preventative efforts are cost-effective for the owner to practicably employ.

(e) There are certain effective preventative control options not available due to federal or state restrictions.

(f) Under certain circumstances, as determined by the department, permitting public hunting may not be a practicable self-help method due to the size and nature of the property, the property's setting, or the ability of the landowner to accommodate public access.

(3) An owner is not eligible to receive compensation if the damages are covered by insurance.

(4) The commission shall adopt rules implementing this section, including requirements that owners document nonlethal preventive efforts undertaken and all permits issued by the department under RCW 77.12.240 and 77.12.150.

[2009 c 333 § 56.]

Notes: Effective date -- Application -- 2009 c 333 §§ 53-66: See notes following RCW 77.36.010.

#### 77.36.120. Department's duties.

The department shall establish:

- (1) The form of affidavits or proof required to accompany all claims under this chapter;
- (2) The process, time, and methods used to identify and assess damage, including the anticipated timeline for the initiation and conclusion of department action;
- (3) How claims will be prioritized when available funds for reimbursement are limited;
- (4) Timelines after the discovery of damage by which an owner must file a claim or notify the department;
- (5) Protocols for an owner to follow if the owner wishes to undertake activities that would complicate the determination of damages, such as harvesting damaged crops;
- (6) The process for determining damage assessments, including the role and selection of professional damage assessors and the responsibility for reimbursing third-party assessors for their services;
- (7) Timelines for a claimant to accept, reject, or appeal a determination made by the department;
- (8) The identification of instances when an owner would be ineligible for compensation;
- (9) An appeals process for an owner eligible for compensation under RCW 77.36.100 who is denied a claim or feels the compensation is insufficient; and
- (10) Other policies necessary for administering this chapter.

[2009 c 333 § 57.]

Notes: Effective date -- Application -- 2009 c 333 §§ 53-66: See notes following RCW 77.36.010.

#### 77.36.130. Limit on cash compensation — Burden of proof.

(1) Except as otherwise provided in this section and as limited by RCW 77.36.100, 77.36.070, and 77.36.080, the cash compensation portion of each claim by the department under this chapter is limited to the lesser of:

(a) The value of the damage to the property by wildlife reduced by the amount of compensation provided to the claimant by any nonprofit organizations that provide compensation to private property owners due to financial losses caused by wildlife interactions, except that, subject to appropriation to pay compensation for damage to commercial livestock, the value of killed or injured commercial livestock may be no more than two hundred dollars per sheep, one thousand five hundred dollars per head of cattle, and one thousand five hundred dollars per horse; or

(b) Ten thousand dollars.

(2) The department may offer to pay a claim for an amount in excess of ten thousand dollars to the owners of commercial crops or commercial livestock filing a claim under RCW 77.36.100 only if the outcome of an appeal filed by the claimant under RCW 77.36.100 determines a payment higher than ten thousand dollars.

(3) All payments of claims by the department under this chapter must be paid to the owner of the damaged property and may not be assigned to a third party.

(4) The burden of proving all property damage, including damage to commercial crops and commercial livestock, belongs to the claimant.

[2009 c 333 § 58.]

Notes: Effective date -- Application -- 2009 c 333 §§ 53-66: See notes following RCW 77.36.010.

#### 77.36.140. Chapter represents exclusive remedy.

This chapter represents the exclusive remedy against the state for damage caused by wildlife interactions.

[2009 c 333 § 62.]

Notes: Effective date -- Application -- 2009 c 333 §§ 53-66: See notes following RCW 77.36.010.

#### 77.36.150. Review of rules and policies. (Expires July 30, 2014.)

The fish and wildlife commission shall formally review the rules and policies adopted under sections \*53 through 66, chapter 333, Laws of 2009. If, in the process of reviewing the rules, the fish and wildlife commission identifies recommended statutory changes related to the subject of sections \*53 through 66, chapter 333, Laws of 2009 and to the ability of the fish and wildlife commission to fulfill the intent of sections \*53 through 66, chapter 333, Laws of 2009, those recommendations must be forwarded to the appropriate policy committees of the legislature during the regularly scheduled 2014 legislative session.

[2009 c 333 § 64.]

Notes: \*Reviser's note: Section 53, chapter 333, Laws of 2009 was vetoed by the governor.

Expiration date -- 2009 c 333 § 64: "Section 64 of this act expires July 30, 2014." [2009 c 333 § 70.]

Effective date -- Application -- 2009 c 333 §§ 53-66: See notes following RCW 77.36.010.

## **WAC 232-36 Wildlife interaction regulations.**

### WAC Sections

- 232-36-010. Introduction.
- 232-36-020. Purpose.
- 232-36-030. Definitions.
- 232-36-040. Wildlife/human interaction and conflict resolution for private property damage.
- 232-36-050. Killing wildlife for personal safety.
- 232-36-051. Killing wildlife causing private property damage.
- 232-36-055. Disposal of wildlife killed for personal safety or for causing private property damage.
- 232-36-060. Director or his/her designee is empowered to grant wildlife control operator certifications.
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- 232-36-100. Payment for commercial crop damage — Limitations.
- 232-36-110. Application for cash compensation for commercial crop damage — Procedure.
- 232-36-120. Valuation methods for crop damage assessment.
- 232-36-200. Payment for commercial livestock damage — Limitations.
- 232-36-210. Application for cash compensation for commercial livestock damage — Procedure
- 232-36-300. Public hunting requirements.
- 232-36-400. Commercial crop or livestock damage claim — Dispute resolution.
- 232-36-500. Unlawful taking or possession of wildlife for personal safety or causing property damage — Penalties.
- 232-36-510. Failure to abide by the conditions of permits, provide completed forms, or submit required documents or reports.

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### 232-36-010. Introduction.

The Washington department of fish and wildlife's (department) primary responsibility is to preserve, protect, perpetuate, and manage the fish and wildlife species of the state (RCW 77.04.012). The department promotes conservation of fish and wildlife, while providing fishing, hunting, fish and wildlife viewing, and other outdoor recreational opportunities compatible with healthy, diverse, and sustainable fish and wildlife populations. (RCW 77.04.012, 77.04.020, and 77.04.055.)

[Statutory Authority: RCW 77.04.012, 77.04.020, and 77.04.055. 10-13-182 (Order 10-156), § 232-36-010, filed 6/23/10, effective 7/24/10.]

### 232-36-020. Purpose.

Public support for the recovery and management of healthy wildlife populations is an important aspect of wildlife conservation. Support for wildlife can diminish when people experience negative interactions with wildlife and damage

to private property. The intent of the department is to provide technical advice and assistance to property owners to prevent and mitigate damages caused by wildlife. Compensation may be necessary in situations where preventative measures are not successful or when circumstances, outside the control of the private property owner, get in the way of resolving negative wildlife interactions.

[Statutory Authority: RCW 77.04.012, 77.04.020, and 77.04.055. 10-13-182 (Order 10-156), § 232-36-020, filed 6/23/10, effective 7/24/10.]

### 232-36-030. Definitions.

Definitions used in rules of the fish and wildlife commission are defined in RCW 77.08.010, and the definitions for wildlife interactions are defined in RCW 77.36.010. In addition, unless otherwise provided, the following definitions are applicable to this chapter:

"Act of damaging" means that private property is in the process of being damaged by wildlife, and the wildlife are on the private property, which contains commercial crops, pasture, or livestock.

"Big game" means those animals listed in RCW 77.08.030.

"Claim" means an application to the department for compensation under this chapter.

"Claimant" means owner of commercial crop or livestock who has filed a wildlife damage claim for cash compensation.

"Commercial crop" means a commercially raised horticultural and/or agricultural product and includes the growing or harvested product, but does not include livestock, forest land, or rangeland. For the purposes of this chapter, Christmas trees and managed pasture grown using agricultural methods including one or more of the following: Seeding, planting, fertilizing, irrigating, and all parts of horticultural trees, are considered a commercial crop and are eligible for cash compensation.

"Commercial livestock" means cattle, sheep, and horses held or raised by a person for sale.

"Compensation" means a cash payment, materials, or service.

"Completed written claim" means that all of the information required on a department crop or livestock damage claim form is supplied and complete, including all supplemental information and certifications required to process the claim.

"Damage" means economic losses caused by wildlife interactions.

"Damage claim assessment" means department approved methods to evaluate crop loss and value caused by deer or elk damage to commercial crops, or livestock losses and value caused by bear, cougar, or wolves.

"Eligible farmer" means an owner who satisfies the definition of eligible farmer pursuant to RCW 82.08.855 (4)(b)(i) through (iv).

"Emergent" means an unforeseen circumstance beyond the control of the landowner or tenant, that presents a real and immediate threat to crops, domestic animals, or fowl.

"Game animal" means wild animals that shall not be hunted except as authorized by the commission.

"Immediate family member" means spouse, state registered domestic partner, brother, sister, grandparent, parent, child, or grandchild.

"Immediate threat of physical harm" means that animal-to-human bodily contact is imminent; and the animal is in attack posture/mode.

"Owner" means a person who has a legal right to commercial crops, commercial livestock, or other private property that was damaged during a wildlife interaction.

"Physical act of attacking" means actual or imminent animal-to-human physical contact.

"Public hunting" means an owner satisfies the "public hunting" requirement for his or her land, as defined in WAC 232-36-300.

"Wild animal" means those species of the class Mammalia whose members exist in Washington in a wild state.

"Wildlife control operator" means a person who has successfully completed the training and obtained one or more levels of certification from the department to assist landowners to prevent or control problems caused by wildlife.

"Wildlife interaction" means the negative interaction and the resultant damage between wildlife and commercial crops, commercial livestock, or other property.

[Statutory Authority: RCW 77.04.012, 77.04.020, and 77.04.055. 10-13-182 (Order 10-156), § 232-36-030, filed 6/23/10, effective 7/24/10.]

### 232-36-040. Wildlife/human interaction and conflict resolution for private property damage.

The department is the primary source for property owners seeking to determine legal and effective remedies for addressing wildlife interactions. Protection of property using nonlethal techniques is the primary response encouraged by the department. Harassment and/or lethal removal may also be important techniques to protect human safety or to protect property. The following criteria describe the compensation available to protect property that does not qualify under commercial crop or livestock damage:

- (1) Unless specifically appropriated by the legislature, cash compensation will not be provided to property owners by the department.
  - (2) Compensation will be prioritized in the following order:
    - (a) Property prioritization:
      - (i) Private property that is primarily designed for public use, where there is a human safety risk not addressed by other entities.
      - (ii) Private property that directly contributes to commercial crop or livestock production.
      - (iii) Private property used for other business purposes.
      - (iv) Public property.
      - (v) Residential property.
      - (vi) Recreational property.
    - (b) Species prioritization:
      - (i) Damages caused by wildlife listed as endangered, threatened, sensitive, or categories of concern by the state or federal government.
      - (ii) Damages caused by big game animals.
      - (iii) Other federal and state protected species.
      - (iv) Other wildlife species except unclassified species and predatory birds.
  - (3) The department may make agreements with private landowners to prevent property damage. These agreements may include the use of:
    - (a) Best management practices to reduce risk of private property damage;
    - (b) Scaring or hazing materials;
    - (c) Fencing materials;
    - (d) Volunteers referred by the department for hazing, fence repair, etc; and
    - (e) Lethal removal options.
  - (4) Private property owners must utilize nonlethal abatement techniques prior to requesting other compensation from the department or before utilizing lethal techniques as outlined in WAC 232-36-050.
    - (a) Use of nonlethal techniques must be documented and consistent with procedures and requirements established by the department.
    - (b) Evidence of damage (e.g., photographs) must be provided by the property owner.
    - (c) Property owner must comply with reporting requirements of the department.
  - (5) Wildlife may not be captured and transported or relocated off the owner's property (parcel where damage occurred) unless:
    - (a) Authorized by rule of the commission; or
    - (b) By written permit from the department; and
    - (c) Owner is in compliance with department rules, permits, and reporting requirements.
  - (6) The department will establish written procedures for assisting private property owners, using the criteria and priorities provided in this rule. The procedures will include enlistment of partners and volunteers through agreements, permits, and incentives to help mitigate wildlife interactions.

[Statutory Authority: RCW 77.04.012, 77.04.020, and 77.04.055. 10-13-182 (Order 10-156), § 232-36-040, filed 6/23/10, effective 7/24/10.]

## 232-36-050. Killing wildlife for personal safety.

- (1) The fish and wildlife commission is authorized to classify wildlife as game, as endangered or protected species, or as a predatory bird consistent with RCW 77.08.010 and 77.12.020. The commission is also authorized, pursuant to RCW 77.36.030, to establish the limitations and conditions on killing or trapping wildlife that is threatening human safety.
- (2) The conditions for killing wildlife vary, based primarily on the classification of the wildlife species and the imminent nature of the threat to personal safety. Additional conditions defined by the department may also be important, depending on individual situations. Killing wildlife for personal safety is subject to all other state and federal laws including, but not limited to, Titles 77 RCW and 232 WAC.
- (3) Killing wildlife for personal safety.
  - (a) It is permissible to kill wild animals engaged in the physical act of attacking a person.

- (b) It is permissible to kill game animals posing an immediate threat of physical harm to a person.

[Statutory Authority: RCW 77.04.012, 77.04.020, and 77.04.055. 10-13-182 (Order 10-156), § 232-36-050, filed 6/23/10, effective 7/24/10.]

### 232-36-051. Killing wildlife causing private property damage.

The fish and wildlife commission is authorized to classify wildlife as game, as endangered or protected species, or as a predatory bird consistent with RCW 77.08.010 and 77.12.020. The commission is also authorized, pursuant to RCW 77.36.030, to establish the limitations and conditions on killing or trapping wildlife that is causing property damage.

The conditions for killing wildlife vary, based primarily on the classification of the wildlife species, the imminent nature of the threat to damage private property, the type of private property damage, and the preventive and nonlethal methods employed by the person prior to the damage event. Additional conditions defined by the department may also be important, depending on individual situations. Killing wildlife to address private property damage is subject to all other state and federal laws including, but not limited to, Titles 77 RCW and 232 WAC.

- (1) Killing wildlife causing damage to a commercial crop or commercial livestock.

(a) It is permissible to kill unclassified wildlife, predatory birds, and big game animals that are in the act of damaging commercial crops or livestock, under the following conditions:

(i) Predatory birds (defined in RCW 77.08.010(39)) and unclassified wildlife that are in the act of damaging commercial crops or livestock may be killed with the express permission of the owner at any time on private property, to protect commercial crops or livestock.

(ii) An owner with a valid, written damage prevention agreement with the department may kill an individual (one) big game animal while it is in the act of damaging commercial crops.

(iii) An individual (one) big game animal may be killed during the physical act of attacking livestock or pets.

(iv) Multiple big game animals may be killed while they are in the act of damaging commercial crops or livestock if the owner is issued a kill permit by the department.

(v) A damage prevention agreement or kill permit must include: An approved checklist of the reasonable preventative and nonlethal means that must be employed prior to lethal removal; a description of the properties where lethal removal is allowed; the species and sex of the animal that may be killed; the terms of the agreement/permit; the dates when lethal removal is authorized; who may kill the animal(s); and other conditions developed within department procedural documents.

(b) It is unlawful to kill protected species (as defined in WAC 232-12-011) or endangered species (as defined in WAC 232-12-014) unless authorized by commission rule or with a permit from the department, with the following additional requirements:

(i) Federally listed threatened or endangered species will require federal permits or federal authority, in addition to a state permit.

(ii) All migratory birds are federally protected and may require a federal permit or federal authority, in addition to a state permit.

(2) Killing wildlife causing damage or killing wildlife to prevent private property damage.

(a) Predatory birds (as defined in RCW 77.08.010(39)), unclassified wildlife, and eastern gray squirrels may be killed with the express permission of the property owner at any time, to prevent private property damage on private real property.

(b) Subject to subsection (6) of this section, the following list of wildlife species may be killed with the express permission of the owner, when causing damage to private property: Raccoon, fox, bobcat, beaver, muskrat, mink, river otter, weasel, hare, and cottontail rabbits.

(c) The department may make agreements with landowners to prevent private property damage by wildlife. The agreements may include special hunting season permits such as: Landowner damage prevention permits, spring black bear hunting permits, permits issued through the landowner hunting permit program, kill permits, and Master Hunter permits.

(d) Landowners are encouraged to allow general season hunters during established hunting seasons on their property to help minimize damage potential and concerns.

(3) Wildlife control operators may assist property owners under the conditions of their permit, as established in WAC 232-36-060 and 232-36-065.

(4) Tribal members may assist property owners under the conditions of valid comanagement agreements between tribes and the department. Tribes must be in compliance with the agreements including, but not limited to, adhering to reporting requirements and harvest restrictions.

(5) Hunting licenses and tags are not required to kill wildlife under this section, unless the killing is pursuant to

subsections (2)(c) and (d) of this section. Tribal members operating under subsection (4) of this section are required to meet tribal hunting license, tag, and permit requirements.

(6) Except as specifically provided in a permit from the department or a rule of the commission, people taking wildlife under this rule are subject to the laws and rules of the state including, but not limited to, those found in Titles 77 RCW and 220 and 232 WAC.

[Statutory Authority: RCW 77.04.012, 77.04.055, 77.12.047, and 77.36.030. 10-23-026 (Order 10-291), § 232-36-051, filed 11/8/10, effective 12/9/10. Statutory Authority: RCW 77.04.012, 77.04.020, and 77.04.055. 10-13-182 (Order 10-156), § 232-36-051, filed 6/23/10, effective 7/24/10.]

### 232-36-055. Disposal of wildlife killed for personal safety or for causing private property damage.

The fish and wildlife commission is authorized pursuant to RCW 77.36.030, to establish the limitations and conditions on disposal of wildlife killed or trapped because they were threatening human safety or causing property damage.

Except as specifically provided in a permit from the department or a rule of the commission, people taking wildlife under this title are subject to the laws and rules of the state including, but not limited to, those found in Titles 77 RCW and 220 and 232 WAC. Wildlife taken under this chapter remains the property of the state and may be disposed of in the manner and under the conditions that follow:

(1) Wildlife taken under WAC 232-36-050 (1)(b) and 232-36-051 (1)(b), and 232-36-051 (1)(a)(iii) must be reported to the department within twenty-four hours, and the animal and all parts must be provided to the department or its designees.

(2) Wildlife taken under WAC 232-36-051 (1)(a)(i) and (ii) becomes the property of the private landowner and may be lawfully disposed consistent with state laws and rules including, but not limited to, Titles 77 RCW and 232 WAC.

(3) Wildlife taken under WAC 232-36-051 (1)(a)(iv) must be disposed of consistent with the conditions identified under the permit.

(4) Wildlife taken under WAC 232-36-051(2) may be lawfully possessed by the owner, licensee, and/or permit holder. Possession of legally taken wildlife by tribal members is subject to the laws of their tribe and must be consistent with their agreement with the state.

[Statutory Authority: RCW 77.04.012, 77.04.020, and 77.04.055. 10-13-182 (Order 10-156), § 232-36-055, filed 6/23/10, effective 7/24/10.]

### 232-36-060. Director or his/her designee is empowered to grant wildlife control operator certifications.

For purposes of training individuals to assist landowners with employing nonlethal management techniques, or to harass, kill, trap, release, and dispatch animals that are causing damage to private property, the director or his/her designee may issue wildlife control operator (WCO) certifications.

(1) To qualify for WCO certification, applicants must:

(a) Be at least eighteen years of age;

(b) Take and complete the department's WCO certifications course;

(c) Be certified by the department and have the equipment, knowledge, and ability to control the wildlife species causing conflict or property damage;

(d) Be legally eligible to possess a firearm and without a felony or domestic violence conviction including, but not limited to, convictions under chapter 9A RCW, unless firearm possession rights have been restored;

(e) Not have a gross misdemeanor fish and wildlife conviction within the last five years; and

(f) Pay the enrollment fee for certification training/education. After July 1, 2010, this fee shall be fifty dollars (RCW 77.12.184).

(2) Once a person is granted WCO certification, he or she must apply for a permit pursuant to WAC 232-36-065 in order to harass, kill, trap, release, or dispatch animals causing damage to private property.

[Statutory Authority: RCW 77.04.012, 77.04.020, and 77.04.055. 10-13-182 (Order 10-156), § 232-36-060, filed 6/23/10, effective 7/24/10.]

### 232-36-065. Director or his/her designee is empowered to issue wildlife control operator permits to address wildlife interactions.

For purposes of assisting property owners in managing animals causing damage to private property, the director or his/her designee may issue permits to wildlife control operators (WCOs). Only WCOs who are certified by the department qualify for such a permit.

(1) If the certification for a WCO included training for the use of live traps, the WCO may use live traps to capture any animal causing an animal problem, as that term is defined in RCW 77.15.192.

(2) Depending on a WCO's certification training, he or she may use body gripping traps, but only if he or she complies with RCW 77.15.194.

(3) WCOs who trap wildlife under the authority of a department permit may not release or dispose of such wildlife without the consent of the property owner where the wildlife is to be released or disposed.

(4) WCOs must submit a complete annual report of all control activity on the form supplied by the department. The report must be received or postmarked on or before the twentieth day of April each year. Failure to submit a report may result in the department revoking the WCO's certification and permit and suspending the person's right to future certification and permits.

(5) WCO certification and permits will be revoked and future certification and permits denied by the director or issuing authority when, in the judgment of the department:

- (a) Information contained in a WCO's application was inaccurate or false;
- (b) The WCO fails to comply with department statutes or rules; or
- (c) The WCO violates a trapping or other wildlife law.

(6) A WCO who provides false or misleading information in his or her WCO certification application may be punished under RCW 9A.76.175 or 40.16.030. A WCO who fails to comply with department statutes or rules as required by his or her WCO certification and permit may be punished under RCW 77.15.750. A WCO who violates trapping or other wildlife laws may be punished under the appropriate statute in Title 77 RCW for that crime.

(7) If the initial application for WCO certification is denied or revoked, or the application to renew a WCO's certification is denied or revoked, the department shall provide the applicant, in writing, a statement of the specific reason(s) for the denial or revocation. The applicant may request an appeal in accordance with chapter 34.05 RCW. Appeal requests shall be filed in writing and returned within twenty days from the mailing date of the denial and be addressed to WDFW Legal Services Office, 600 Capitol Way North, Olympia, Washington 98501-1091.

(8) WCO certification and permits are valid for three years.

(9) It is unlawful to trap, harass, or otherwise control wildlife on the property of another for a fee or other consideration without a WCO certification and permit.

(10) The department may develop additional conditions and procedures, to include training requirements, for WCOs consistent with this rule.

[Statutory Authority: RCW 77.04.012, 77.04.020, and 77.04.055. 10-13-182 (Order 10-156), § 232-36-065, filed 6/23/10, effective 7/24/10.]

## 232-36-100. Payment for commercial crop damage — Limitations.

Owners, who have worked with the department to prevent deer and elk damage, but continue to experience losses, may be eligible to file a damage claim and receive cash compensation from money appropriated by the legislature. Damages payable under this section are limited to the lost or diminished value of a commercial crop, whether growing or harvested, and shall be paid only to the owner of the crop at the time of damage, without assignment. Cash compensation for claims from deer and elk damage shall not include damage to other real or personal property, including other vegetation or animals, lost profits, consequential damages, or any other damages. The department is authorized to pay up to ten thousand dollars to the owner per claim.

Claims for cash compensation will be denied when:

- (1) The claim is for a noncommercial crop;
- (2) The owner of the commercial crop does not meet the definition of "eligible farmer" in RCW 82.08.855 (4)(b)(i) through (iv);
- (3) The loss estimate is less than one thousand dollars;
- (4) No claim will be processed unless the owner provides the department with an approved checklist of the preventative and nonlethal means that have been employed, and the owner has complied with the terms and conditions of his or her agreement(s) with the department;
- (5) An owner or lessee has accepted noncash compensation to offset crop damage in lieu of cash. Acceptance of noncash compensation will constitute full and final payment for crop damages within the growing season of the damaged crop;
- (6) Damages to the commercial crops claimed are covered by insurance or are eligible for payment from other entities. Any portion of the actual damage not covered by others is eligible for compensation from the department;
- (7) The property where the damage occurred was not open to public hunting consistent with WAC 232-36-300 for the species causing the damage, unless, as determined by the department, the property is inconsistent with hunting or hunting would not address the damage problem. This includes all properties owned or leased by the owner adjacent to, contiguous to, or in the vicinity of the property where crop damage occurred;

- (8) The crop is grown or stored on public property;
- (9) The owner or lessee fails to provide on-site access to the department or designee for inspection and investigation of alleged damage or to verify eligibility for a claim;
- (10) The owner has not provided a completed written claim form and all other required information, or met required timelines prescribed within WAC 232-36-110;
- (11) The owner fails to sign a statement affirming that the facts and supporting documents are truthful to the best of the owner's knowledge;
- (12) The owner or designee has harvested commercial crops without an investigation completed under the direction of the department; or
- (13) The department has expended all funds appropriated for payment of such claims for the current fiscal year.

[Statutory Authority: RCW 77.04.012, 77.04.020, and 77.04.055. 10-13-182 (Order 10-156), § 232-36-100, filed 6/23/10, effective 7/24/10.]

## 232-36-110. Application for cash compensation for commercial crop damage — Procedure.

Pursuant to this section, the department may distribute money appropriated by the legislature to pay commercial crop damage caused by wild deer or elk in the amount of up to ten thousand dollars per claim, unless following an appeal the department is ordered to pay more (see RCW 77.36.130(2)). The department shall develop claim procedures and application forms consistent with this section for cash compensation of commercial crop damage. Partnerships with other public and private organizations to assist with completion of applications, assessment of damage, and to provide funding for compensation are encouraged.

### Filing a claim:

- (1) Owners who have worked with the department to prevent deer or elk damage, yet who still experience loss and meet eligibility requirements, may file a claim for cash compensation.
- (2) The claimant must notify the department within seventy-two hours of discovery of crop damage and at least seventy-two hours prior to harvest of the claimed crop.
- (3) A complete, written claim must be submitted to the department within sixty days of when the damage stops.
- (4) Owners may only file one claim per year. Multiple partners in a farming operation are considered one owner. Operations involving multiple partners must designate a "primary grower" to receive payment from the department.
- (5) The claim form declaration must be signed, affirming that the information provided is factual and truthful per the certification set out in RCW 9A.72.085, before the department will process the claim.
- (6) In addition to a completed claim form, an applicant must provide:
  - (a) A copy of applicant's Schedule F of Form 1040, Form 1120, or other applicable forms filed with the Internal Revenue Service indicating the applicant's gross sales or harvested value of commercial crops for the previous tax year.
  - (b) The assessment method used consistent with WAC 232-36-120, valuation of property damage.
  - (c) Applicant must provide proof of ownership of claimed commercial crops or contractual lease of claimed commercial crops consistent with department procedural requirements for submission of documents.
  - (d) Written documentation of approved methodology used to assess and determine final crop loss and value.
  - (e) Applicant must provide records documenting average yield on claimed crop and parcel, certified yield reports, production reports and weight certificates completed at the time weighed for claimed year, and other applicable documents that support yield loss and current market price. Current market price will be determined less transportation and cleaning costs when applicable.
  - (f) Declaration signed under penalty of perjury as provided in RCW 9A.72.085, indicating that the applicant is eligible for the claim, meets eligibility requirements listed under this section, and that all claim evaluation and assessment information in the claim application is to the best knowledge of the claimant true and accurate.
  - (g) Copy of the insurance policy and payment on the commercial crop where loss is claimed.
  - (h) Copy of application for other sources of loss compensation and any payment or denial documentation.

### Damage claim assessment:

- (7) Damage claim assessment of amount and value of commercial crop loss is the primary responsibility of the claimant. A crop damage evaluation and assessment must be conducted by a licensed crop insurance adjustor:
  - (a) The owner must submit a damage claim assessment prepared by a crop insurance adjustor licensed by the state of Washington and certified by the federal crop insurance service.
  - (b) The department will provide the claimant with a list of approved adjustors. The owner must select an adjustor from the approved list and arrange for the completion of a crop damage assessment. Adjustor fees will be the shared responsibility of the owner and the department.
  - (c) The department or the owner may accept the damage claim assessment provided by the licensed adjuster or may

hire a state licensed adjustor of their choosing and conduct a separate assessment or evaluation of the crop loss amount and value. The party hiring an adjustor to conduct a separate assessment or evaluation is responsible for payment of all fees.

(8) Disagreement between the claimant and the department over the crop loss value may be settled through an adjudicative proceeding.

Settlement of claims:

(9) Subject to money appropriated to pay commercial crop damage, undisputed claims will be paid, less one-half of the crop adjustor's fee or a maximum of six hundred dollars for the owner's share of the crop adjustor's fee. The crop adjustor's fee is not subject to the ten thousand dollar payment limit per owner.

(10) Compensation paid by the department, in addition to any other compensation received by the claimant, may not exceed the total value of the assessed crop loss.

(11) The owner will be notified by the department upon completion of the evaluation and has sixty days to accept or appeal the department's offer for settlement of the claim, or the claim is considered satisfied and not subject to appeal.

(12) The department shall prioritize payment for commercial crop damage in the order the claims were received or upon final adjudication of an appeal. If the department is unable to make a payment for commercial crop damage during the first fiscal year of a biennium, the claim shall be held over until the following fiscal year when funds become available. Claims that are carried over will take first priority and receive payment before any new claims are paid. Claims will not be carried from one biennium to the next.

[Statutory Authority: RCW 77.04.012, 77.04.020, and 77.04.055. 10-13-182 (Order 10-156), § 232-36-110, filed 6/23/10, effective 7/24/10.]

## 232-36-120. Valuation methods for crop damage assessment.

Several methods may be used to determine the extent of a crop damaged by deer and elk and the lost value of the crop resulting from the damage. Assessment methods used by qualified crop adjustors licensed by the state and certified by the federal crop insurance service will be accepted by the department. Evaluation of crop losses must consider other impacts to crop production, including fertilization, irrigation, precipitation, weather, timing of planting or harvest, and weed control. The following methods are listed in preferred order based on reliability:

(1) Amount consumed - relies on wildlife-proof enclosures in the field; clipping similar sized plots inside and outside of enclosures; then comparing yields.

(2) Amount of stored crops consumed or damaged - determine the bales or pounds of stored crops consumed or destroyed; then determine replacement value.

(3) Replacement value of horticultural trees lost as a result of damage; partial loss due to damage can be estimated per tree based on the percentage destroyed.

(4) Damage vs. undamaged areas - using random sampling methods to compare the yields of damaged to undamaged portions of a field or two similar fields can provide an estimate of loss. Comparing similar fields assumes the fields are truly "similar" (soil type, aspect, slope, irrigation, fertilization, stand age, etc.).

(5) Animal use - count the number of animals causing damage and the number of days they were present; then estimate the percentage of daily intake provided by the crop (generally less than fifty percent), and the amount of waste, trampling, or trampling; the result should also consider the timing of the damage and potential recovery of the vegetation prior to crop harvest.

(6) Decrease from average yield - historic yields can be used for comparison; the difference between average yield and current yield may shed light on the extent of damage; changing weather or crop growing conditions from one year to the next make this technique less reliable.

[Statutory Authority: RCW 77.04.012, 77.04.020, and 77.04.055. 10-13-182 (Order 10-156), § 232-36-120, filed 6/23/10, effective 7/24/10.]

## 232-36-200. Payment for commercial livestock damage — Limitations.

Owners who have worked with the department to prevent depredation but continue to experience losses, or who experience unforeseen losses, may be eligible to file a damage claim and receive cash compensation. Cash compensation will only be provided to livestock owners by the department when specifically appropriated by the legislature. Damages payable under this section are limited to the lost or diminished value of commercial livestock caused by wild bears, cougars, or wolves and shall be paid only to the owner of the livestock at the time of damage, without assignment. Cash compensation for livestock losses from bears, cougars, and wolves shall not include damage to other real or personal

property, including other vegetation or animals, lost profits, consequential damages, or any other damages including veterinarian services. The department is authorized to pay up to two hundred dollars per sheep and one thousand five hundred dollars per head of cattle or per horse, and no more than ten thousand dollars to the commercial livestock owner per claim.

Claims for cash compensation will be denied when:

- (1) Funds for livestock compensation have not been specifically appropriated by the legislature;
- (2) The claim is for livestock other than sheep, cattle, or horses;
- (3) The owner of the commercial livestock does not meet the definition of "eligible farmer" in RCW 82.08.855
- (4)(b)(i) through (iv);
- (4) The loss estimate is less than five hundred dollars;
- (5) The owner fails to provide the department with an approved checklist of the preventative and nonlethal means that have been employed, or the owner failed to comply with the terms and conditions of his or her agreement(s) with the department;
- (6) The owner has accepted noncash compensation to offset livestock losses in lieu of cash. Acceptance of noncash compensation will constitute full and final payment for livestock losses within a fiscal year;
- (7) Damages to the commercial livestock claimed are covered by insurance or are eligible for payment from other entities. However, any portion of the damage not covered by others is eligible for filing a claim with the department;
- (8) The owner fails to provide on-site access to the department or designee for inspection and investigation of alleged attack or to verify eligibility for claim;
- (9) The owner has not provided a completed written claim form and all other required information, or met required timelines prescribed within this chapter;
- (10) No claim will be processed if the owner fails to sign a statement affirming that the facts and supporting documents are truthful to the best of the owner's knowledge;
- (11) The owner or designee has salvaged or rendered the carcass or allowed it to be scavenged without an investigation completed under the direction of the department; or
- (12) The department has expended all funds appropriated for payment of such claims for the current fiscal year.

[Statutory Authority: RCW 77.04.012, 77.04.020, and 77.04.055. 10-13-182 (Order 10-156), § 232-36-200, filed 6/23/10, effective 7/24/10.]

### 232-36-210. Application for cash compensation for commercial livestock damage — Procedure.

Pursuant to this section, the department may distribute money specifically appropriated by the legislature to pay commercial livestock losses caused by wild bear, cougar, or wolves in the amount of up to ten thousand dollars per claim unless, following an appeal, the department is ordered to pay more (see RCW 77.36.130(2)). The department will develop claim procedures and application forms consistent with this section for cash compensation of commercial livestock losses. Partnerships with other public and private organizations to assist with completion of applications, assessment of losses, and to provide funding for compensation are encouraged.

Filing a claim:

- (1) Owners who have worked with the department to prevent livestock depredation, yet who still experience loss or losses that occur under emergent situations, may file a claim for cash compensation if they meet eligibility requirements.
- (2) Claimant must notify the department within twenty-four hours of discovery of livestock attack.
- (3) Damage claim assessment of amount and value of commercial livestock loss is the primary responsibility of the claimant.
- (4) Assessment of loss will be conducted by the department:
  - (a) The owner must provide access to department staff or designees to investigate the cause of death or injury to livestock and use reasonable measures to protect evidence at the depredation site.
  - (b) Federal officials may be responsible for the investigation when it is suspected that the attack was by a federally listed species.
- (5) Claimant must request a damage claim application within ten days of a loss.
- (6) A complete, written claim must be submitted to the department within sixty days of an attack on commercial livestock.
- (7) The claim form declaration must be signed, affirming that the information provided is factual and truthful, before the department will process a claim.
- (8) In addition to a completed claim form, an applicant must provide:
  - (a) A copy of applicant's Schedule F of Form 1040, Form 1120, or other applicable forms filed with the Internal

Revenue Service indicating the applicant's gross sales or value of commercial livestock for the previous tax year.

- (b) Claimant must provide proof of legal ownership or contractual lease of claimed livestock.
- (c) Claimant must provide records documenting livestock value based on current market price.
- (d) Declaration signed under penalty of perjury indicating that the applicant is eligible for the claim, meets eligibility requirements listed under this section, and all claim evaluation and assessment information in the claim application is to the best knowledge of the claimant true and accurate.
- (e) Copy of any insurance policy covering livestock loss claimed.
- (f) Copy of application for other sources of loss compensation and any payment or denial documentation.

Settlement of claims:

- (9) Subject to money appropriated to pay for commercial livestock losses, undisputed claims will be paid up to ten thousand dollars.
- (10) Compensation paid by the department, in addition to any other compensation, may not exceed the total value of the assessed livestock loss.
- (11) Upon completion of the evaluation, the department will notify the owner of its decision to either deny the claim or make a settlement offer (order). The owner has sixty days from the date received to accept the department's offer for settlement of the claim or to submit an appeal of the order. The response must be in writing and the signed document may be mailed or submitted by fax or e-mail. If no written acceptance or request for appeal is received, the offer is considered rejected and not subject to appeal.
- (12) The department will prioritize payment for commercial livestock losses in the order the claims were received or upon final adjudication of an appeal. If the department is unable to make a payment for commercial livestock losses during the first fiscal year of a biennium, the claim shall be held over until the following fiscal year when funds become available. Claims that are carried over will take first priority and receive payment before any new claims are paid. Claims will not be carried from one biennium to the next.

[Statutory Authority: RCW 77.04.012, 77.04.020, and 77.04.055. 10-13-182 (Order 10-156), § 232-36-210, filed 6/23/10, effective 7/24/10.]

### 232-36-300. Public hunting requirements.

"Public hunting" generally means that land is open for licensed hunters. The intent of the provision in this chapter is to allow hunting at an appropriate time, manner, and level to help prevent property damage.

As specified in WAC 232-36-100, cash compensation will only be paid when the property where the damage occurred is open to public hunting. Public hunting is defined as:

- (1) The landowner opens the property on which the damage or loss is claimed for general access to all licensed hunters during the season prior to the occurrence of damage; or
- (2) The landowner has entered into and complied with any agreement with the department covering the land(s) on which the damage is claimed. Access agreements shall require that:
  - (a) The land is open to general access to licensed hunters; or
  - (b) The landowner allows the department to select a limited number of hunters who are authorized to access the land; or
  - (c) The landowner and the department determine how hunters will be selected and authorized to hunt on the landowner's property in order to effectively prevent damage.

[Statutory Authority: RCW 77.04.012, 77.04.020, and 77.04.055. 10-13-182 (Order 10-156), § 232-36-300, filed 6/23/10, effective 7/24/10.]

### 232-36-400. Commercial crop or livestock damage claim — Dispute resolution.

For claims where the owner has met all claim eligibility criteria and procedures, but ultimately rejects the written settlement offer (order) for crop or livestock loss and/or value assessment, the provisions of this section shall apply:

Informal resolution:

- (1) If the owner rejects the property loss or value assessment and would like to discuss a negotiated settlement, he or she can request a meeting by notifying the department in writing within ten days of receiving the settlement offer or claim denial (order).
- (2) A department representative and the owner or designee(s) will meet and attempt to come to mutual resolution.

(3) Monetary compensation or noncash compensation, mutually agreed upon by both the department and owner, shall be binding and constitute full and final payment for claim.

(4) If parties cannot agree upon damages, the owner may elect to apply for an adjudicative proceeding pursuant to chapter 34.05 RCW.

Adjudicative proceeding:

(5) If the owner wishes to appeal the claim denial or the department settlement offer (order), the owner may request an adjudicative proceeding consistent with chapter 34.05 RCW within sixty days of receiving the original order.

(6) The request must comply with the following:

(a) The request must be in writing, and the signed document may be mailed or submitted by fax or e-mail;

(b) It must clearly identify the order being contested (or attach a copy of the order);

(c) It must state the grounds on which the order is being contested and include the specific facts of the order that are relevant to the appeal; and

(d) The request must identify the relief being requested from the proceeding (e.g., modifying specific provisions of the order).

(7) The proceeding may only result in the reversal or modification of an order when the preponderance of evidence shows:

(a) The order was not authorized by law or rule;

(b) A fact stated in the order is materially incorrect;

(c) The award amount offered is inconsistent with applicable and accepted procedures, rule, and/or law; or

(d) Material information or evidence was made available by the owner at the time of the damage assessment, but was not considered in the order.

(8) The burden of proof is on the appellant (owner) to show that he or she is eligible for a claim and that the damage assessment is reliable (see RCW 77.36.130(4)).

(9) Findings of the hearings officer are subject to the annual funding limits appropriated by the legislature and payment rules (WAC 232-36-110(12) and 232-36-210(9)) of the commission.

[Statutory Authority: RCW 77.04.012, 77.04.020, and 77.04.055. 10-13-182 (Order 10-156), § 232-36-400, filed 6/23/10, effective 7/24/10.]

## 232-36-500. Unlawful taking or possession of wildlife for personal safety or causing property damage — Penalties.

(1) The unlawful trapping, killing, or possession of wildlife is punishable under Title 77 RCW including, but not limited to, the following:

(a) RCW 77.15.120 for endangered wildlife;

(b) RCW 77.15.130 for protected wildlife;

(c) RCW 77.15.140 for unclassified wildlife;

(d) RCW 77.15.170 for wildlife wastage;

(e) RCW 77.15.190 and 77.15.194 for unlawful trapping or traps;

(f) RCW 77.15.290 for transportation of wildlife;

(g) RCW 77.15.400 for wild birds;

(h) RCW 77.15.410 for big game;

(i) RCW 77.15.420 for illegally taken or possessed wildlife; and

(j) RCW 77.15.430 for wild animals.

(2) A person trapping or killing wildlife who fails to notify the department pursuant to WAC 232-36-055 may be in violation of RCW 77.15.750(1).

[Statutory Authority: RCW 77.04.012, 77.04.020, and 77.04.055. 10-13-182 (Order 10-156), § 232-36-500, filed 6/23/10, effective 7/24/10.]

## 232-36-510. Failure to abide by the conditions of permits, provide completed forms, or submit required documents or reports.

(1) Failure to abide by the conditions of permits is a misdemeanor pursuant to RCW 77.15.750.

(2) Failure to provide reports or abide by the conditions of landowner agreements is an infraction pursuant to RCW 77.15.160.

(3) Failure to abide by the conditions of wildlife conflict operator permits is a misdemeanor pursuant to RCW

77.15.750.

(4) A person who provides false or misleading information required by this chapter may be in violation of RCW 9A.76.175 or 40.16.030.

[Statutory Authority: RCW 77.04.012, 77.04.020, and 77.04.055. 10-13-182 (Order 10-156), § 232-36-510, filed 6/23/10, effective 7/24/10.]

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Appendix G. Development of wolf population models for RAMAS© analysis by the Washington Department of Fish and Wildlife.

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***Abstract***

Washington Department of Fish and Wildlife contracted with Washington State University to create a wolf population model derived from vital rates based on empirical data from other states in the Northwestern United States. We applied an existing habitat model for Idaho, Montana, and Wyoming to the Washington landscape to determine extent of probable recolonization. Wolf territory size was determined by data from Northwest Montana, Central Idaho, and an average of the two areas. We created three metapopulation landscapes based on pack territories evenly distributed across the state where average probability of recolonization for individual pack territories exceeded 15% and 50%. Using RAMAS GIS, we created a female only, stage matrix model with dispersal based on population metrics from Idaho and Northwest Montana. This model is intended to be a versatile and adaptive tool for managers to project potential recovery and extirpation probabilities for different management regimes and can be easily modified with empirical data as wolves recolonize Washington.

**Introduction**

Washington Department of Fish and Wildlife (WDFW) contracted with Washington State University (WSU) to develop a wolf population model based on population vital rates (i.e. survival, fecundity, territory size, etc) reported in peer review and agency literature or empirical data obtained for wolf populations from the Northwestern states (ID, MT, WY). Additionally, the agency requested development of RAMAS computer program metapopulation files that WDFW could use to explore wolf population dynamics under the targeted recovery levels and different management scenarios considered in its draft Wolf Conservation and Management Plan (Wiles and Allen 2009)

Extensive spatial and demographic datasets have been collected on wolves recolonizing Idaho and Western Montana. Spatially explicit population models and recolonization probability models have been derived to predict potential habitat suitability in several areas not yet recolonized by wolves (Larsen 2004, Carroll et al. 2006, Oakleaf et al. 2006) and were reported in WDFW's draft Wolf Conservation and Management Plan for Washington (Wiles and Allen 2009). These habitat models can provide a tool to wildlife managers by predicting potential numbers and distribution of wolves in areas where they will likely recolonize.

Our objective was to use research on landscape and population metrics (habitat selection, survival, fecundity, dispersal, etc) from existing wolf populations to create a model that represent population dynamics from Idaho and Montana that could serve as a baseline to model potential population dynamics in Washington. Specifically we created three landscape dispersal models for Washington based on average pack territory size and the distribution of potential habitat. We used survival and fecundity data as well as knowledge of wolf social pack structure to create landscape population

models in RAMAS GIS to project potential recovery and extirpation probabilities for different management regimes in Washington.

### Study Area

We developed a landscape population viability model for the three recovery regions (Figure 1) in Washington identified in the draft 2009 Wolf Conservation and Management Plan (Wiles and Allen 2009). The Eastern Washington Region was the area of the state east of highway 97, 17, and 395. The North Cascades Region included the portion of the state north of Interstate 90 and west of highway 97 and 17. The Southern Cascades and Northwest Coast recovery region included the Cascades south of Interstate 90 to the Oregon border and the Coastal region of Washington.

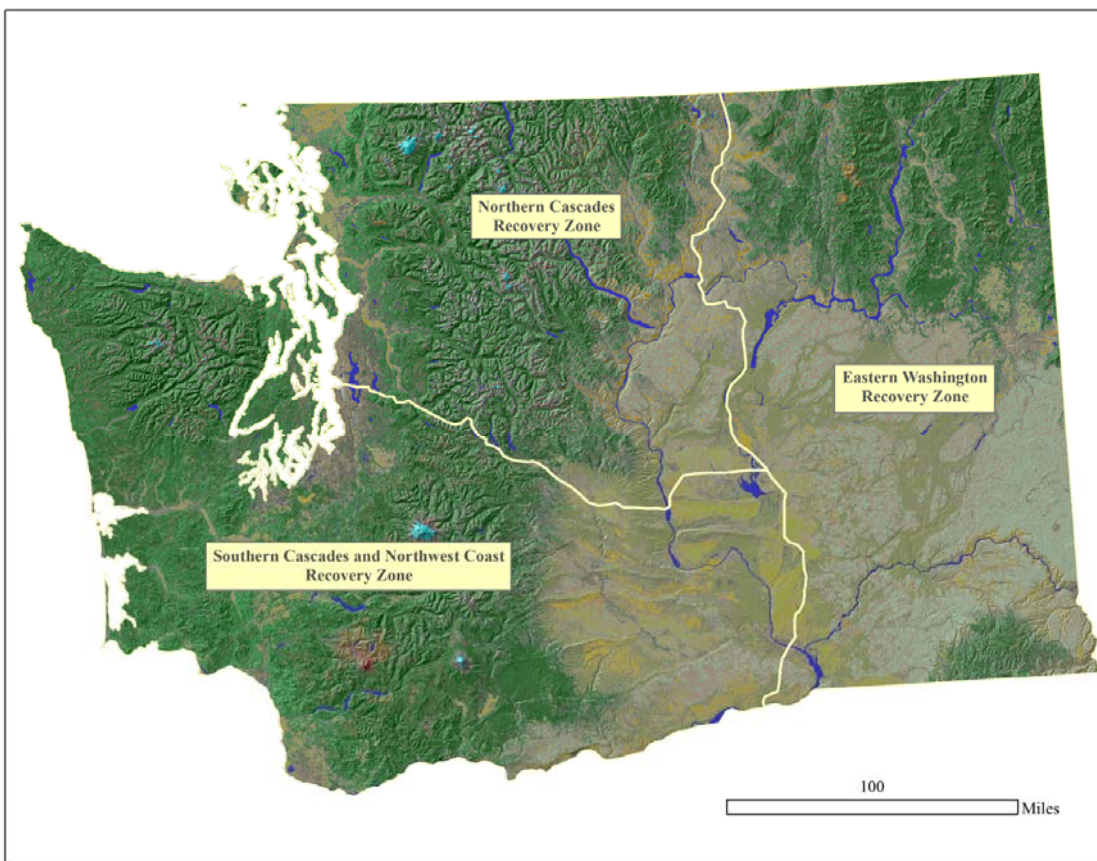


Figure 1. Wolf recovery regions identified in the draft 2009 EIS/Wolf Conservation and Management Plan for Washington (Wiles and Allen 2009).

### Methods

We used a habitat model developed by Oakleaf et al. (2006) to quantify relative probabilities of habitat use to determine areas where wolves may potentially inhabit Washington. The model parameters included forest cover, human density, ungulate density, and density of domestic sheep. The equation is  $P_{wolves} = -4.457 + (0.057) \text{ Forest Cover} + (-0.87) \text{ Human density} + (1.351) \text{ Elk} + (-$

1.735) Sheep density (Oakleaf et al. 2006). We used the Spatial Analyst extension in ArcGIS 9.1 to calculate the model probabilities.

### *Landscape Model*

We used the National Land Cover Data (30 m resolution) to develop a map for the percent forest cover. We isolated the forest cover types and created a new raster calculating the percent forest cover within 9 km<sup>2</sup> grid.

Human census data were derived from information collected in 2000 by U.S. Bureau of Census. We converted census data from census block groups to the number of people per square kilometer. We then created a raster layer of human population density for a 9 km grid.

Ungulate density data were based on unpublished harvest statistics provided by Washington Department of Fish and Wildlife. All successful general harvest and permit hunts were tallied for each game management unit (GMU) and divided by the total area of each GMU (Oakleaf et al. 2006). The total harvest per GMU was then averaged over a three-year period from 2003 to 2005 to estimate relative density of deer and elk. Oakleaf et al. (2006) averaged total harvest over a 5-year period, however significant changes in Washington's GMU and permit boundaries only allowed a consistent average of 3 years.

Domestic sheep density was calculated from U.S. Department of Agriculture statistics on total sheep per county from 1997 - 2002. The density estimate for domestic sheep excluded any national parks or wilderness areas where sheep would not be allowed to free range. Domestic sheep may be free ranged in separate counties from the locations of the ranch where they are tallied so the impacts to wolves may be different than the relative densities used in the analysis and further investigation of range allotments may be needed to better understand this impact.

### *Hypothetical Pack Territories*

Using the statewide recolonization probability layer as the extent of the outer boundary for hypothetical pack territories, we generated regular spaced points with alternating rows aligned at the midpoint. Points were spaced regularly based on the diameter of average pack territory size. We created circles with a radius of 13.8 km for Northwest Montana data (Rich 2010), 17.2 km for Central Idaho data (USFWS 1999), and 15.6 km as an average of both areas and saturated the entire landscape of Washington.

We overlaid the hypothetical packs with the habitat probability layer (Oakleaf et al. 2006) and calculated the average probability of recolonization for wolves for each territory. Any territory with an average probability > 15% was included in the initial landscape population model. Packs on the border were identified as dispersal corridors or potential source populations. We converted the centroid locations of the pack territories to grids with a cell size of 1 km<sup>2</sup> and imported the territory locations into RAMAS GIS (Akçakaya 2002) to create three different landscapes (Central Idaho recovery, Northwest Montana recovery, mean of both) for the metapopulation models.

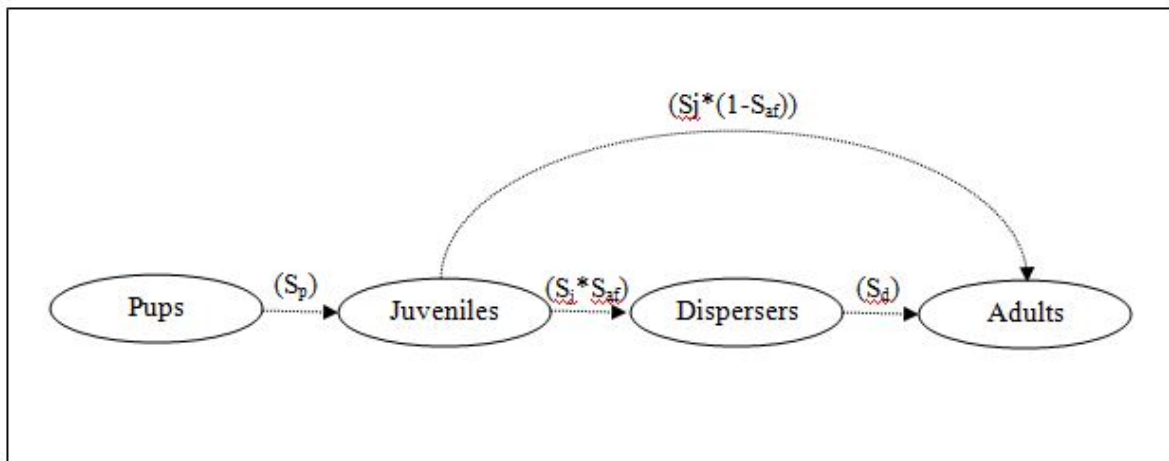


Figure 2. Life cycle graph for a stage matrix model for wolves. Stages include pups (0-1 yr old), juveniles (1-2 yr old), dispersers (3-4 yr old), and adults (4+) with associated transition probabilities where  $S_p$  is annual survival rate of pups,  $S_j$  is the annual survival rate of juveniles,  $S_d$  is the annual survival rate of dispersers, and  $S_{af}$  is the annual survival rate of adult females.

#### *RAMAS Landscape Population Model*

We created a female only - four stage matrix model in RAMAS GIS – Metapopulation model (Akçakaya 2002) where individual packs were considered populations in a statewide metapopulation analysis.

We then created a stage matrix (Table 1) which incorporated transition equations from stage to stage. Stages (Figure 2) included pups (0-1 year of age), juveniles (1-2 year olds), dispersers (3-4 year olds), and adults (4+). Transitions for fecundity of adult females was the product of average litter size of newborns (4.12) observed in the Central Idaho recovery area (for successfully reproducing females) \* percentage of successfully reproductive females (70%) \* sex ratio (50%) \* survival rate of adult females (Lambert et al. 2006).

In Idaho, litter size was determined by den site and rendezvous site inspections (Mitchell et al. 2008) and we calculated the average litter size from annual averages presented in the 2005 – 2009 annual Idaho wolf progress reports (Mack et al. 2010, Nadeau et al. 2009, Nadeau et al. 2008, Nadeau et al. 2007, Nadeau et al. 2006). The data on litter size from Northwest Montana was estimated primarily from aerial and ground observations of pack denning in spring as well as composition observations during the fall months (Mitchell et al. 2008). With few actual den site inspections in Northwest

Table 1. Stage matrix transition probabilities for a Quantitative Population Viability Analysis using parameter estimates from Northwest Montana (a) and Central Idaho Recovery area (b).

a. Northwest Montana

	Pups	Juveniles	Dispersers	Adults
Pups	0.00	0.35	1.04	1.04
Juveniles	0.81	0.00	0.00	0.00
Dispersers	0.00	0.52	0.00	0.00
Adults	0.00	0.20	0.72	0.72

b. Central Idaho Recovery area

	Pups	Juveniles	Dispersers	Adults
Pups	0.00	0.37	1.14	1.14
Juveniles	0.89	0.00	0.00	0.00
Dispersers	0.00	0.64	0.00	0.00
Adults	0.00	0.15	0.79	0.79

Montana, the litter counts may have been underestimated so we used Central Idaho estimates of litter size for all fecundity calculations.

The percentage of successfully reproductive females was determined by the ratio of packs with pups in December each given year divided by the total number of packs for that year in a given recovery area (Smith et al. 2010, Mack et al. 2010). Fecundity of juveniles was 1/3 that of dispersers and adult females (Boyd and Pletscher 1999).

Transition probabilities from stage to stage were the products of stage specific survival rates \* percentage of that group moving to a specific stage. For example the transition from juvenile to adult breeder in a pack was  $S_j (0.72) * 1 - S_{af} (0.28) = 0.20$  or the probability of a juvenile female surviving times the probability of a resident adult female dying (Table 1a). The transition from juvenile to disperser was  $S_j (0.72) * S_{af} (0.72) = 0.52$  or the probability of a juvenile female surviving times the probability of a resident adult female surviving in a pack. Transitions from dispersers to adults and adults to adults were simply their survival rates.

Survival rates for wolves in Central Idaho was estimated from data collected between 1995 – 2004 and Northwest Montana from 1982 -2004 (Table 2, Smith et al. 2010). Due to higher levels of mortality and potentially demographic stochasticity while at lower numbers, the wolf population in Northwest Montana grew at a much slower rate than the Central Idaho Recovery area population.

Table 2. Demographic parameters including survival of pups ( $S_p$ ), juveniles ( $S_j$ ), dispersers ( $S_d$ ), and adult females ( $S_{af}$ ), maternity ( $m_x$ ), fecundity ( $F_x$ ), and growth rate ( $R$ ) for wolf populations in Central Idaho, Northwest Montana, and Greater Yellowstone areas.

Demographic parameters	Location of data set	
	CIR <sup>a</sup>	NWMT <sup>b</sup>
$S_p$	0.89 (0.18)	0.81 <sup>c</sup> (0.16)
$S_j$	0.79 (0.18)	0.72 <sup>d</sup> (0.16)
$S_d$	0.79 (0.18)	0.72 <sup>d</sup> (0.16)
$S_{af}$	0.79 (0.18)	0.72 <sup>d</sup> (0.16)
$m_x$	2.884 <sup>e</sup>	2.884 <sup>e</sup>
$F_x$	1.14	1.04
$R$	1.34	1.22

<sup>a</sup> Central Idaho Recovery area, Smith et al. (2010).

<sup>b</sup> Northwest Montana, Smith et al. (2010).

<sup>c</sup> NWMT pup survival is 9% lower than CIR, Smith et al. (2010).

<sup>d</sup> NWMT survival rates were calculated from weighted average of 1987 – 2004, Smith et al. (2010).

<sup>e</sup> Litter size and ratio of reproductive packs/total packs from Mack et al. (2010), Nadeau et al. (2009), Nadeau et al. (2008), Nadeau et al. (2007), Nadeau et al. (2006).

The population trend in Northwest Montana from 1995 (minimum 66 wolves) through 2004 (minimum 59 wolves) was stable to slightly declining with an intrinsic rate of growth rate of 0.988 during that time period (Sime et al. 2011). The pup survival during that time period as reported by Smith et al. (2010) was only 0.398 (0.273, 0.579; 95% CI;  $n = 27$  deaths) and the adult survival was 0.68 (0.643, 0.740; 95% CI;  $n=107$  deaths) which when we input into the model displayed a similar decline in the intrinsic rate of growth for the population. From 2004 to 2010 the population increased from 59 to 374 wolves (Sime et al. 2011), displaying an intrinsic rate of growth of 1.36 which was similar to the population growth observed in Central Idaho following the reintroduction (Mack et al. 2010). We used the weighted (# animals) adult survival data from 1987 – 2004 in Northwest Montana because sample sizes were small and unreliable from 1982 to 1986. The survival for adult wolves (Table 2) from 1987 – 2004 in Northwest Montana was 0.72 (0.16) which was 9% lower than what we observed in Central Idaho. We did not have empirical data on pup survival over the same time period so we decreased the Idaho pup survival by the same percentage (9%) as the adult survival was decreased for consistency of estimates for Northwest Montana.

Environmental and demographic stochasticity was built into our model by inputting the standard deviations observed from the time series into the matrix model for fecundity and survival. The standard deviation of survival was calculated from the average annual survival for all years monitored for a given area.

### *Density Dependence*

Pack size and density dependence affected all vital rates and was based on a ceiling model where the observed survival and fecundity rates were used until the carrying capacity ( $k$ ) of each pack exceeded ( $k$ ) at which time growth rates abruptly declined to 1.0. Carrying capacity for each pack was set to 4 combined female juveniles, dispersers and adults and based on half (female only component) the

average pack size for the Central Idaho and Northwest Montana (Boyd and Pletscher 1999, USFWS 1999, Mitchell et al. 2008).

### *Dispersal*

All dispersal aged animals dispersed or became breeders. Minimum age of reproduction was 2 years (22 months, Mech 1970) for juveniles in our model and mean dispersal age of wolves was 3 years (35.7 months, Boyd and Pletscher 1999) for dispersers in our model. Average dispersal distance for wolves was similar between sexes with an average distance of 95.5 km (113 km for males, 78 km for females) with a maximum dispersal distance of 840 km (Boyd and Pletscher, 1999). These metrics were used to create a dispersal function in RAMAS GIS – Metapopulation and develop a matrix to determine probabilities of dispersal between hypothetical packs in Washington. Large scale landscape features that pose potential barriers to dispersal movements, such as the Columbia Basin and Puget Sound, were set to zero in the dispersal matrix.

## **Results**

### *Testing Population Growth Projections*

Our model, using demographic and pack size parameters from Northwest Montana, yielded a population growth rate of 1.22 compared to the observed growth rate of wolves in Northwest Montana of 1.22 (Sime et al. 2011). The model for the Central Idaho Recovery area yielded a growth rate of 1.34 compared to an observed growth rate of 1.34 (Mack et al. 2010). The same occurred for wolf pack size with an average of 8 wolves per pack for both the average observed (Boyd and Pletscher 1999, USFWS 1999, Mitchell et al. 2008) and modeled pack size. The similarity between the modeled intrinsic growth rates and pack size and the observed growth rates and pack size for Northwest Montana and the Central Idaho Recovery area gives us confidence that our model structure represents reality.

## **Discussion**

We created the models to be versatile and adaptive because of the uncertainty of average pack or territory size for wolves recolonizing Washington. We have not been able to assess the accuracy of the Oakleaf (2006) habitat model, particularly its applicability for the Washington landscape. However, the probabilities of recolonization are built in as part of individual pack sub-populations in RAMAS, therefore the population model can be easily adapted as more empirical data is collected during the recolonization of wolves in Washington.

Our model gives the Washington Department of Fish and Wildlife the ability in the future, when actual data for Washington wolves are available, to predict potential effects of management decisions on wolves. The model split into separate recovery regions or specified for the entire statewide metapopulation and can also be easily modified as information on dispersal, landscape connectivity, and demographic parameters are collected on wolves in Washington.













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**Literature Cited**

- Akcakaya, H.R. 2002. RAMAS GIS: Linking Spatial Data with Population Viability Analysis (version 4.0). Applied Biomathematics, Setauket, New York.
- Boyd, D.K. and D.H. Pletscher. 1999. Characteristics of dispersal in a colonizing wolf population in the Central Rocky Mountains. *Journal of Wildlife Management*. 63(4): 1094-1108.
- Carroll, C., M.K. Phillips, C.A. Lopez-Gonzalez, and N.H. Schumaker. 2006. Defining recovery goals and strategies for endangered species: The wolf as a case study. *BioScience*. 56(1): 25-37.
- Chapron, G., R. Wielgus, P. Quenette, J. Camarra. 2009. Diagnosing mechanisms of decline and planning for recovery of an endangered brown bear (*Ursus arctos*) population. *Plos One*. 4(10) 1-7.
- Lambert, C. M., R. B. Wielgus, H. S. Robinson, H. S. Cruickshank, R. Clarke, and J. Almack. 2006. Cougar population dynamics and viability in the Pacific Northwest. *Journal of Wildlife Management* 70:246-254.
- Larsen, T. 2004. Modeling gray wolf habitat in Oregon using a geographic information system. MSc Thesis, Oregon State University, Corvallis, Oregon. Pg. 69.
- Mack, C., J. Rachael, J. Holyan, J. Husseman, M. Lucid, B. Thomas. 2010. Wolf conservation and management in Idaho; progress report 2009. Nez Perce Tribe Wolf Recovery Project, P.O. Box 365, Lapwai, Idaho; Idaho Department of Fish and Game, 600 South Walnut, Boise, Idaho. 67 pp.
- Mitchell, M.S., D.E. Ausband, C.A. Sime, E.E. Bangs, J.A. Gude, M.D. Jimenez, C.M. Mack, T.J. Meier, M. S. Nadeau, and D.W. Smith. 2008. Estimation of successful breeding pairs for wolves in the northern Rocky Mountains, USA. *Journal of Wildlife Management*. 72(4): 881-891.
- Nadeau, M. S., C. Mack, J. Holyan, J. Husseman, M. Lucid, B. Thomas. 2006. Wolf conservation and management in Idaho; progress report 2005. Idaho Department of Fish and Game, 600 South Walnut, Boise, Idaho; Nez Perce Tribe, P.O. Box 365, Lapwai, Idaho. 61 pp.
- Nadeau, M. S., C. Mack, J. Holyan, J. Husseman, M. Lucid, P. Frame, B. Thomas. 2007. Wolf conservation and management in Idaho; progress report 2006. Idaho Department of Fish and Game, 600 South Walnut, Boise, Idaho; Nez Perce Tribe, P.O. Box 365, Lapwai, Idaho. 73 pp.
- Nadeau, M. S., C. Mack, J. Holyan, J. Husseman, M. Lucid, B. Thomas, D. Spicer. 2008. Wolf conservation and management in Idaho; progress report 2007. Idaho Department of Fish and Game, 600 South Walnut, Boise, Idaho; Nez Perce Tribe, P.O. Box 365, Lapwai, Idaho. 73pp.
- Nadeau, M. S., C. Mack, J. Holyan, J. Husseman, M. Lucid, D. Spicer, B. Thomas. 2009. Wolf conservation and management in Idaho; progress report 2008. Idaho Department of Fish and Game, 600 South Walnut, Boise, Idaho; Nez Perce Tribe, P.O. Box 365, Lapwai, Idaho. 106 pp.
- Oakleaf, John K., Dennis L. Murray, James R. Oakleaf, Edward E. Bangs, Curt M. Mack, Douglas W. Smith, Joseph A. Fontaine, Michael D. Jimenez, Thomas J. Meier, Carter C. Niemeyer. 2006. Habitat Selection by recolonizing wolves in the northern Rocky Mountains of the United States. *Journal of Wildlife Management*. 70(2): 554-663.
- Rich, Lindsey N. 2010. An assessment of factors influencing territory size and the use of hunter surveys for monitoring wolves in Montana. M.S. Thesis. University of Montana, Missoula, MT. pg 94.
- Sime, Carolyn A., V. Asher, L. Bradley, N. Lance, K. Laudon, M. Ross, A. Nelson, and J. Steuber. 2011. Montana gray wolf conservation and management 2010 annual report. Montana Fish, Wildlife & Parks. Helena, Montana. 168 pp

- Smith, D. W., E.E. Bangs, J.K. Oakleaf, C. Mack, J. Fontaine, D. Boyd, M. Jimenez, D.H. Pletscher, C.C. Niemeyer, T.J. Meier, D.R. Stahler, J. Holyan, V.J. Asher, and D.L. Murray. 2010. Survival of colonizing wolves in the northern Rocky Mountains of the United States, 1982-2004. *Journal of Wildlife Management*. 74(4): 620-634.
- United States Fish and Wildlife Service. 1999. Rocky Mountain Wolf Recovery 1999 Annual Report. <http://www.fws.gov/mountain-prairie/species/mammals/wolf/annualrpt99/>
- Wielgus, R.B., F. Sarrazin, R. Ferriere, and J. Clobert. 2001. Estimating effects of adult male mortality on grizzly bear population growth and persistence using matrix models. *Biological Conservation*. 98: 293-303.
- Wielgus, R.B. 2002. Minimum viable population and reserve sizes of naturally regulated grizzly bears in British Columbia. *Biological Conservation*. 106: 381-388.
- Wiles, G. and H. Allen. 2009. Draft wolf conservation and management plan for Washington. Washington Department of Fish and Wildlife, Olympia, WA.








## Appendix 1

GIS Layers	Description of layer.
\PVA_GIS\Prob_AVE\	Navigation to folder
 WP_15_6_PT15_pts.shp	Points layer with centroids of hypothetical wolf packs
 cir15_6km_PT15.shp	Polygon layer of hypothetical wolf packs with average recolonization probabilities >15% ~ Average territory size (766 km <sup>2</sup> ) between NWMT and Idaho.
 WP_15_6_PT50_pts.shp	Polygon layer of hypothetical wolf packs with average recolonization probabilities >50% ~ Average territory size (766 km <sup>2</sup> ) between NWMT and Idaho.
\PVA_GIS\Prob_PT_ID\	Navigation to folder
 WP_17_2_P15_pt.shp	Points layer with centroids of hypothetical wolf packs
 WP_17_2_P15.shp	Polygon layer of hypothetical wolf packs with average recolonization probabilities >15% ~ Average territory size (766 km <sup>2</sup> ) between NWMT and Idaho.
 WP_17_2_P50.shp	Polygon layer of hypothetical wolf packs with average recolonization probabilities >50% ~ Average territory size (933 km <sup>2</sup> ) for Idaho wolves (USFWS 1999).
\PVA_GIS\Prob_PT_MT\	Navigation to folder
 WP_13_8km_P15_pt1.shp	Points layer with centroids of hypothetical wolf packs
 WP_13_8km_P15.shp	Polygon layer of hypothetical wolf packs with average recolonization probabilities >15% ~ Average territory size (599.8 km <sup>2</sup> ) for Idaho wolves (Rich 2010).
 WP_13_8km_P50.shp	Polygon layer of hypothetical wolf packs with average recolonization probabilities >50% ~ Average territory size (599.8 km <sup>2</sup> ) for Idaho wolves (Rich 2010).
\PVA_GIS\raster\	Navigation to folder
 wolf_prob_elk	Raster layer depicting the habitat model of recolonization probabilities for wolves in Washington created by Maletzke (2006) from parameter metrics specified by Oakleaf et al. (2006).
\PVA_GIS\	Navigation to folder
 wolf_zone	Raster layer depicting the Washington Wolf Recovery Zones defined by the draft wolf conservation and management plan for Washington (Wiles and Allen, 2009).
 Wolf_Rec_Zones.shp	Polygon layer depicting the Washington Wolf Recovery Zones defined by the draft wolf conservation and management plan for Washington (Wiles and Allen, 2009).

Attribute table descriptions for Hypothetical Pack Territory polygon shapefiles.

<u>Attribute</u>	<u>Description</u>
MEAN	Average probability of recolonization
Wolf_Zone	Washington Wolf Recovery Region
Pack_ID	Unique ID for each pack which links to RAMAS GIS files
Border	Pack territory intersects Washington state boundary (Y/N)

## Appendix 2

GIS Layers	Description of layer.
\PVA_GIS\RAMAS\	Navigation to folder
 Wolf_13_8km_NWMT_Prob_2Apr2011	RAMAS GIS metapopulation model with all packs on average >15% probability of recolonization with NWMT territory size and demographic parameter estimates. (Contains border packs)
 Wolf_17_2km_ID_Prob_30Mar2011	RAMAS GIS metapopulation model with all packs on average >15% probability of recolonization with ID territory sizes and demographic parameter estimates. (Contains border packs)
 Wolf_15_6km_AVE_Prob_30Mar2011	RAMAS GIS metapopulation model with all packs on average >15% probability of recolonization with an average territory size between NWMT and Idaho and average demographic parameter estimates. (Contains border packs)
\PVA_GIS\RAMAS\Templates\	Navigation to folder
 Wolf_17_2km_ID_Prob_IDparam	RAMAS GIS metapopulation model with Idaho average territory size and population demography metrics from the Central Idaho recovery area. (>50% probability of recolonization and no border packs)
 Wolf_17_2km_ID_Prob_MTparam	RAMAS GIS metapopulation model with Idaho average territory size and population demography metrics from the NW MT recovery area. This model was created as a very conservative model of recolonization, has >50% probability of recolonization and no border packs.
 Wolf_17_2km_ID_Prob_MTparam_NE_cls	RAMAS GIS metapopulation model for only the Eastern WA recovery zone based on Idaho average territory size and population demography metrics from the NW MT recovery area. This model has >50% probability of recolonization, no source population, and no border packs.
 Wolf_17_2km_ID_Prob_MTparam_NE_open	RAMAS GIS metapopulation model for only the Eastern WA recovery zone based on Idaho average territory size and population demography metrics from the NW MT recovery area. This model has >50% probability of recolonization and has a border pack as a source population.

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**Appendix H. Results of nine scenarios of wolf population modeling in Washington using RAMAS (Appendix G).**


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Assumptions/parameters used:

- 1) Pack territory size of 933 km<sup>2</sup> (360 mi<sup>2</sup>) based on data from Idaho (n = 13, USFWS 2000) and Washington (n = 2).
- 2) Survival data from northwestern Montana (Smith et al. 2010), except pup survival of 0.81 (see discussion in Appendix G).
- 3) Four hypothetical packs were used to mimic a low level of immigration, two in British Columbia and one each in northern Idaho and Oregon, except when simulations assumed no immigration.
- 4) Frequency of successful dispersal between packs was a function of distance; maximum dispersal distance used was 200 km (124 miles).
- 5) Average pack size = 8 individuals.
- 6) Average litter size = 4 pups.
- 7) For scenarios where growth was limited and territories were selected, territories with the highest probability of occupancy (based on the suitable habitat model) were used where possible, while maintaining recovery region pack delisting requirements.
- 8) Inbreeding depression was not included.

**NOTE:** The results of this exercise are not considered definitive, and vary widely depending on the assumptions used, especially about wolf survival and immigration.

Scenario (100 simulations, 50 years)	Parameter <sup>a</sup>	Result	Conclusion/Notes
Evaluations of persistence of metapopulation of 15 successful breeding pairs for 50 years			
1. Statewide population growth to 73 possible territories, starting with 2 occupied territories, assume immigration	T <sub>x</sub>	0	With immigration, wolves would maintain about 58 packs, with no risk (0%) of the population declining to extinction.
	M <sub>o</sub>	58.3 (49-65)	
	Q <sub>x</sub>	0	
2. Statewide population growth to 73 possible territories, starting with 2 occupied territories, assume no immigration	T <sub>x</sub>	0.02	With no immigration, the population may grow to 56 packs, but there is a 2% chance it would decline to extinction.
	M <sub>o</sub>	56 (0-64)	
	Q <sub>x</sub>	0.02	
3. Statewide population growth to 73 possible territories, starting with 23 occupied territories (distributed as 7 EW, 7 NC, 9 SC), assume no immigration	T <sub>x</sub>	0	Starting with the recovery objective (15 breeding pairs) met, wolves would likely persist if demographically significant immigration was stopped.
	M <sub>o</sub>	56.3 (47-63)	
	Q <sub>x</sub>	0	

**NOTE:** The results of this exercise are not considered definitive, and vary widely depending on the assumptions used, especially about wolf survival and immigration.

Scenario (100 simulations, 50 years)	Parameter <sup>a</sup>	Results	Conclusion/Notes
4. Start with 23 packs (distributed as 7 EW, 7 NC, 9 SC) to approximate the 5/4/6 recovery objective, no additional growth (i.e., population is capped), assume immigration	Tx	<0.03	Starting with the recovery objective (15 breeding pairs) met but further population growth is capped, the likelihood of needing to relist/falling below the statewide recovery objective is high (93%), even with continued immigration.
	Mo	19.0 (14-22)	
	Qx	0.93	
5. Start with 23 packs (distributed as 7 EW, 7 NC, 9 SC) to approximate the 5/4/6 recovery objective, no additional growth (i.e., population is capped), assume no immigration	Tx	<0.01	Starting with the recovery objective (15 breeding pairs) met but further population growth is capped and immigration is stopped, there is a 97% risk of having to relist/falling below the statewide recovery objective.
	Mo	18.6 (15-23)	
	Qx	0.97	
Evaluations of management scenarios after recovery objectives met within a recovery region			
6. Start with recovery objective (5 breeding pairs) met in the Eastern WA recovery region, but not in the other two recovery regions; assume immigration, conduct management  Quasi-extinction at statewide level (<46 adult + dispersing females)	Tx	<0.01	Conducting wolf management in the Eastern WA recovery region after recovery objectives are met there, but before regional objectives are met in the other two regions, will not inhibit the ability to achieve recovery in all three regions over time.
	Mo	58 (50-66)	
	Qx	<0.01	
7. Start with recovery objective (5 breeding pairs) met in the Eastern WA recovery region, but not in the other two recovery regions; assume immigration, conduct management  Quasi-extinction at recovery region level (<12 adult + dispersing females)	Tx	<0.01	Conducting wolf management in the Eastern WA recovery region after recovery objectives are met there, but before regional objectives are met in the other two regions and with continued immigration, results in a 7% risk of falling below the recovery objective for Eastern WA; model assumed 1 of 5 pairs established in Blue Mountains.
	Mo	9 (6-12)	
	Qx	<0.07	

**NOTE:** The results of this exercise are not considered definitive, and vary widely depending on the assumptions used, especially about wolf survival and immigration.

Scenario (100 simulations, 50 years)	Parameter <sup>a</sup>	Results	Conclusion/Notes
8. Start with recovery objectives (5 breeding pairs) met in the Eastern WA recovery region, but not in the other two recovery regions; assume no immigration, conduct management  Quasi-extinction at statewide level (<46 adult + dispersing females)	T <sub>x</sub>	<0.01	Conducting wolf management in the Eastern WA recovery region after recovery objectives are met there, but before regional objectives are met in the other two regions, will not inhibit the ability to achieve recovery in all three regions over time, even without immigration.
	M <sub>o</sub>	55 (41-62)	
	Q <sub>x</sub>	<0.01	
9. Start with recovery objectives (5 breeding pairs) met in the Eastern WA recovery region, but not in the other two recovery regions; assume no immigration, conduct management  Quasi-extinction at recovery region level (<12 adult + dispersing females)	T <sub>x</sub>	<0.01	Conducting wolf management in the Eastern WA recovery region after recovery objectives are met there, but before regional objectives are met in the other two regions and without any immigration from outside populations, results in a 48% risk of falling below the recovery objective for Eastern WA; model assumed 1 of 5 pairs established in Blue Mountains.
	M <sub>o</sub>	8 (3-11)	
	Q <sub>x</sub>	0.48	

<sup>a</sup>Parameters:

T<sub>x</sub> = Probability of terminal extinction (the probability that the metapopulation will be extinct at the end of the duration, in this case 50 years)

M<sub>o</sub> = Metapopulation occupancy (the average number and range of occupied territories during the 50-year period). It is assumed that 70% of occupied territories represent packs with successfully breeding females.

Q<sub>x</sub> = Quasi-extinction probability (the probability that the number of female adults and dispersers will fall below the recovery objective level at which relisting would be warranted).

Management scenario = 0.3 of all disperser and adult age class removed every 4 years after the delisting goal is met.

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Appendix I. Summary of the Wolf Working Group's discussions related to the recovery objectives, recovery regions, and translocation elements of the plan. Discussions by the Working Group on other aspects of the plan can be found in the meeting summaries posted at [http://wdfw.wa.gov/wildlife/management/gray\\_wolf/working\\_group\\_meetings.html](http://wdfw.wa.gov/wildlife/management/gray_wolf/working_group_meetings.html).

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Wolf Working Group participation and discussions prior to the development of the draft EIS/wolf conservation and management plan. They were especially helpful in the preparation of Chapters 3 (wolf conservation) and 4 (wolf-livestock conflicts) of this plan. This appendix summarizes the group's discussions on three of the key elements of the recovery objectives appearing in Chapter 3, including the numbers of successful breeding pairs needed to achieve downlisting and delisting of wolves, the designation of recovery regions, and the use of translocation as a conservation tool.

#### Numbers of Successful Breeding Pairs

Throughout the Wolf Working Group deliberations, the issue of numbers of successful breeding pairs, as criteria for moving from one listing designation to another, was a point of significant discussion. Originally, WDFW suggested that specific numbers be excluded from the plan until after some wolf packs had settled in the state. Modeling of the habitat use and demographics of these animals and genetic considerations could then be used to derive scientifically based estimates of the wolf numbers needed for recovery, which would then be placed in a future version of the plan. All Working Group members rejected this approach and preferred the inclusion of specific numbers in the current plan, as done by other states and as needed to meet the criteria for Washington state recovery plans. Furthermore, specific numbers would give Working Group members a starting place for their deliberations. WDFW researched other state wolf plans and applied their understanding of wildlife biology to the question. It then proposed the numbers of 8 successful breeding pairs for transitioning from endangered to threatened and 15 successful breeding pairs for transitioning from threatened to sensitive as a starting point for the Working Group's consideration.

Eventually, the Working Group collectively settled on an approach that called for 6 successful breeding pairs for transitioning from endangered to threatened, 12 successful breeding pairs for transitioning from threatened to sensitive, and 15 successful breeding pairs for delisting from sensitive. These numbers also required that the minimum number of successful breeding pairs be in place for 3 years (although there are some exceptions; see Chapter 3, Section B) and distribution across three regions.

The deliberation around numbers was a negotiation where each participant attempted to balance his or her own interests with everyone else's in the group. The 6/12/15 numbers were not viewed as "ideal" by anyone on the Working Group; however, these numbers represented the balance point among the different interests around the table. It should be emphasized that these numbers represented only the criteria for downlisting and delisting, and not a population cap or ceiling at which wolves would ultimately be managed.

For Working Group members from the conservation community, the numbers were viewed as being close to ecologically defensible, though lower than they would have set if they were the only ones writing the plan. For the livestock and hunting communities, the numbers were higher than they would have recommended if they were the only ones writing the plan. Working Group

members ultimately recognized that having certainty around a set of numbers they could live with, along with the other specific components of the package that each party viewed as desirable, made more sense than deferring the decision to others. The group further understood that to obtain the necessary external support (e.g., legislative) for funding and operation of the plan, their final product needed support by a cross section of interests.

Throughout the process, some Working Group members representing the livestock/hunting community indicated they would be hard pressed to agree to the 6/12/15 numbers. At the end of the deliberations, while they were able to live with the rest of the package, six of the 17 members indicated they needed to submit a minority report on breeding pair numbers and proposed an alternative set of 3/6/8 numbers (see Appendix K for more detail). They further proposed that there be no 3-year time requirement, but did not address regional distribution. However, the package agreed to by the group was based on the 6/12/15 numbers and if those numbers were changed as a result of the peer review, public review, and other agency processes, then agreement around other components of the plan would not necessarily remain. In particular, consensus on management options for resolving wolf-livestock conflicts and compensation for wolf-caused losses of livestock could be jeopardized.

### Recovery Regions

During the Working Group discussions, there was an evolution in the design and agreement of wolf recovery regions for the state. As one possibility, WDFW initially suggested that Washington's nine "ecoregions" be considered for recovery regions. WDFW and other conservation organizations have adopted an ecoregional approach for landscape-level conservation planning in Washington, as described in the state's Comprehensive Wildlife Conservation Strategy (WDFW 2005a). Ecoregions are relatively large areas of land and water that contain geographically discrete assemblages of natural plant and animal communities and have distinctive environmental conditions.

Each ecoregion has unique strengths and weaknesses affecting wolf recovery, such as differing amounts of large contiguous forested public land blocks, varying abundance of ungulate prey and locations of winter range, human population density and distribution, distance from colonizing sources, and challenges to successful natural dispersal. Some ecoregions (or groupings of ecoregions) contain an abundance of higher quality habitats that could potentially support a growing wolf population with dispersing young (source populations), while others have lower habitat quality where resident packs would have difficulty sustaining themselves without immigration (sink populations).

Some members of the Working Group felt that nine ecoregions were too many and too complex for addressing wolf distribution needs in the state. The group considered a number of variations on the ecoregional approach (including combinations of ecoregions, modifications of ecoregions, and an eastside-westside division of the state) and other factors before arriving at three consolidated regions chosen for use in the recovery objectives.

Like the nine ecoregions, the consolidated wolf recovery regions also have unique strengths and weaknesses affecting wolf recovery. For example, when comparing wolf recovery regions, the Southern Cascades and Northwest Coast recovery region is the most distant from colonizing

sources with greater hurdles to successful natural dispersal, yet this region contains nearly 80% of the state's elk population.

#### Translocation

Translocation was discussed extensively by the Working Group and was largely supported for a variety of reasons. Translocation within Washington was proposed as a tool if wolves were not naturally dispersing into regions needed for recovery, or if it was desired to move wolves from regions that had already achieved recovery objectives to other regions that had not yet met their objectives. Conservation groups supported the concept to achieve recovery objectives and establish source populations within the state. County, hunting, and livestock interests also supported the concept, which would enable moving wolves out of areas after sufficient numbers of breeding pairs were reestablished to achieve recovery objectives, thereby speeding up the delisting process and access to more flexible management tools. Overall, there was broad support and recognition within the Working Group that translocation is a key management tool to ensure that both conservation and management goals are achieved. Translocation is considered an essential part of the "negotiated package" developed by the Working Group.

The primary area suggested and discussed for translocation by the Working Group was the southern Cascade Mountain range based on insights gained from the experiences of wolf recovery in the northern Rocky Mountain states (USFWS 2009). These included the strong correlation between large contiguous blocks of public land and wolf recovery. This is due to large areas of public land generally experiencing lower levels of conflict between wolves and livestock, as well as supporting larger populations of elk.

Discussions on translocation focused on the southern Cascade Mountains for the following reasons:

- The southern Cascades have the potential to support a source population of wolves, a factor of importance for maintaining a sustainable viable population in Washington.
- The southern Cascades contain about half of Washington's elk population and large contiguous blocks of public land. Consequently, there is abundant natural prey for wolves combined with potentially lower levels of conflict with livestock when compared to areas with extensive private landholdings.
- The southern Cascades are distant from colonizing areas in Idaho and British Columbia, and there are more potential barriers to overcome for successful natural dispersal. However, once wolves are reestablished in the southern Cascades, extensive contiguous forested public lands will facilitate natural dispersal within this area.
- Elk populations fluctuate in response to a number of environmental conditions, including forest succession. Portions of the Mount St. Helens elk herd, which is the largest herd in the state, are currently experiencing problems due to advanced forest succession. Wolf recovery in the southern Cascades could help restore and contribute to ecological balance and integrity in these types of situations.

To date there have not been any discussions of translocations to other areas; the primary focus has been the southern Cascade Mountains.

1 This package contains carefully balanced strategies and management tools to achieve key objectives.  
2 There were strong concerns among Working Group members that if translocation was precluded  
3 for any reason, then:  
4

- 5 • The carefully crafted “negotiated package” would become unbalanced in ways that adversely  
6 affect achieving primary goals.
- 7 • Barriers to the natural dispersal of wolves into the southern Cascade Mountains may result in  
8 increasing conflict with livestock in eastern Washington and delayed recovery.
- 9 • Eastern and northern Washington would unfairly bear the costs and challenges of wolf  
10 recovery.  
11

12 The Working Group therefore recommends that if translocation is removed from the management  
13 tools available to WDFW, the Fish and Wildlife Commission or WDFW shall immediately  
14 reconvene the Working Group (to the extent possible with the original membership) to advise  
15 WDFW on how to manage wolves without this critical tool to address these concerns.  
16

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Appendix J. The minority report on proposed numbers of successful breeding pairs for achieving the downlisting and delisting of wolves in Washington, which was submitted by six members of the state's Wolf Working Group in May 2008.

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May 27, 2008

The following represents a minority position held by the following members of the Wolf Working Group (WWG) Jack Field, Duane Cocking, Tommy Petrie, Daryl Asmussen, Jeff Dawson and Ken Oliver (We) on one critical component of the Wolf Working Group Plan; the number of Breeding Pairs (BP) of wolves that the state can support. We are "unable to live with" the proposed numbers in the WWG Draft Plan. We believe the numbers are too high and will result in direct conflict with the Livestock and Sportsman Communities.

Currently the plan calls for 6 BP's to down list to Threatened, 12 BP's to down list to State Sensitive and at least 15 BP's for 3 years before they can be considered for limited hunting( p. 41 WWG draft). During this time period wolf populations could increase 24% per year (Bangs, conversation). Plus at the end of the 3 year time period, there is a very definite probability of one or more lawsuits as is now occurring after the Federal delisting of wolves in the Northern Rocky Mountain (NRM) area. It is estimated that it will take a minimum of 18 months for these challenges to work their way through the court system.

This same scenario will probably occur in this state. Consequently we could be looking at as many as 28 to 35 BP's before control measures could be taken to control their growth. All of this in a state with Washington's Population of 6,490,000 people and a population density of 97.5 people/sq mi (WWG Draft Plan). This is 5 to 6 times the human population density of the 3 principle states in the NRM area, MT, ID, and WY. (WA, WY, ID, and MT state web sites). According to the Federal Register, Feb. 8, 2007, Vol.72, number 26, this state has only 297 square miles of suitable wolf habitat in the eastern third of the state (p.6117 Federal Register). It should be noted that this same source shows the following amounts of suitable habitat in each of the states comprising the NRM are, MT. 40924 sq. mi., WY. 29808 sq. mi., ID. 31,586 sq. mi., OR. 2556 sq. mi. and, UT. 1635 sq. mi. This same report indicates that if the 3 major states (ID, MT, and WY) can support 10 BP's for 3 years that the species can be considered to be fully recovered and can be considered for delisting (p.6107 Federal Register). That criteria was met in 2002 (p. 6111 Federal Register).

The amount of suitable wolf habitat in the remaining two thirds of the state as depicted in the "Application of habitat models to wolf recovery planning in WA" by Carroll indicates scattered habitat in small isolated areas of the Okanogan, larger amounts of marginal habitat both North and South of Mt. Rainier, and a large area of habitat in and around the Olympic National Park, an area that strongly opposed wolf reintroduction several years ago.

Therefore we feel that the WWG's desired number of BP's is unrealistic given the lack of suitable habitat and the much higher human population density of this state and that the requirement of 15 BP's for 3 years (50% Higher than the USFW criteria for recovery in WY, MT, and ID,) defies common sense. This is further compounded by a recent recommendation from the Idaho Department of Fish and Game Commissioners to set the limit for a wolf hunt at 2005 levels which could mean 500 wolves could be killed this year. Idaho Fish and Game biologists estimate there are

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Appendix J. Continued.

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currently about 750 wolves in the state, but after the breeding season this spring they expect more than 1,000. The commissioners on the higher figures because they did not believe that hunting would bring the wolf population numbers down to the levels they wanted to see.

We therefore propose the following numbers of BP's statewide: 3 BP's to down list to Threatened, 6 BP's to down list to State Sensitive, and 8 BP's to change to a Big Game Animal. And we would eliminate the 3 year period since the state was not considered essential for recovery of wolves in the NRM (p.6119 Federal Register). This total number of 8 BP's or approximately 80 wolves would fit in the states economic analysis as outlined in Chapter 14, "Economics" which states "Wolf numbers between 50 and 100 animals should pose little detriment to the states livestock industry as a whole...As wolf populations become larger and more widely distributed, financial impacts are likely to accrue to more producers" (p.126). "Populations of 50 to 100 wolves should not have negative effects on big game hunting in Washington" (p.139).

The advantages of going with a lower number of BP's are: the sooner wolves can be removed from endangered and threatened status, the more tools stockmen and rural residents will have at their disposal to deal with problem wolves.

The sooner we can get wolves de-listed, the sooner our Fish and Wildlife Department can begin to manage them, until then their hands are tied. The sooner we can get them listed as a Big Game Species, the sooner our Fish and Wildlife can turn them from a liability into an asset through the sale of raffle tags, permits, and Governors Tags.

We believe that these numbers are far too high and do not accurately represent the concerns that the livestock production community has with wolves. The livestock community has preferred zero wolves from the beginning however, due to ESA and WDFW requirements zero is not an option. We support the Minority Opinion Numbers of 3 breeding pairs to downlist to threatened, 6 breeding pairs to downlist to sensitive, and 8 breeding pairs to delist from sensitive and managed as a Big Game Species. The higher numbers that the WWG Draft Plan includes will result in far more individual wolves than Washington has habitat to support thus causing a severe negative impact on private landowners and livestock producers. Livestock producers must be able to protect their property regardless of the wolf's status. We are also concerned that the WDFW has not effectively demonstrated its ability to secure long-term funds that will be a requirement in Management and Compensation. Without funding there is **NO Support** of any plan!!

The remainder of the WWG plan is acceptable to the supporters of the minority position.

Jack Field  
Duane Cocking  
Ken Oliver  
Daryl Asmussen  
Jeff Dawson  
Tommy Petrie

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Appendix K. Current response guidelines for reporting suspected wolf activity in Washington.

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# **Response Guidelines For Reported Gray Wolf Activity In Washington State**

Coordinating Agencies:

U.S. Fish and Wildlife Service  
Washington Department of Fish and Wildlife  
USDA/APHIS – Wildlife Services

November 2010

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## **PURPOSE**

These response guidelines are a cooperative effort between the U. S. Fish and Wildlife Service (USFWS), Washington Department of Fish and Wildlife (WDFW) and U.S. Department of Agriculture Wildlife Services (WS). The purpose of the guidelines is to prepare for a coordinated and effective response to possible situations that may occur if wolf/human interactions take place in Washington State. **This is not a wolf management plan or recovery plan.** It does not contain any objectives for establishing wolves in Washington State. The guidelines adhere to federal and, where appropriate, state law and policy and emphasize close interagency and inter-governmental coordination and a common understanding of specific roles and responsibilities between all involved agencies.

## **LEGAL STATUS**

### Federal

1. As of August 2010, the gray wolf is listed as endangered throughout Washington under the federal Endangered Species Act (ESA). The eastern third of Washington is included in the federal Northern Rocky Mountain Distinct Population Segment (NRM DPS). This means that, while WDFW and USFWS are co-managers, the USFWS has overall lead responsibility for wild wolves in Washington while they are federally listed. Wild wolves in Washington are fully protected by the ESA, which is administered and enforced by the USFWS. Wolf-dog hybrids have no federal or state legal status.

For species listed under the federal ESA, activities that may result in “take” of endangered species are generally prohibited. The definition of take under the ESA includes to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct.

Wildlife Services (WS) is the federal agency with nationwide responsibility for managing wildlife damage problems and investigates possible wolf depredation on livestock and/or other domesticated animals and implements control actions under the direction of the USFWS to address conflicts.

### State

2. The gray wolf is also listed as endangered by the State of Washington and receives protection under state law (WAC 232-12-014, RCW 77.15.120). The State may designate agents or enter into cooperative agreements with Federal agencies to enforce State law. The Washington Fish and Wildlife Commission may also promulgate rules to authorize Federal and State agencies concerned with the management of fish and wildlife resources to lethally remove wolves under limited circumstances.

The WDFW currently has a cooperative agreement with the USFWS, under Section 6 of the federal ESA, that provides WDFW authority to manage for the conservation of endangered or threatened species, including gray wolves, within the state, except for lethal take of those

species. The WDFW is in the process of developing a Wolf Conservation and Management Plan for the state.

### Tribal

3. Tribal governments manage wildlife on their reserved lands and they maintain certain rights to wildlife resources on ceded lands in the state.

## **OVERVIEW OF POTENTIAL SITUATIONS**

Discussed below are five situations that might arise in Washington and an overview of the recommended response strategy for each situation. The five situations are:

1. **Unconfirmed report of wolf activity or sightings.**
2. **Verified wolf activity, without a problem incident.**
3. **Report of possible wolf-caused livestock depredation.**
4. **Report of a wolf capture.**
5. **Report of an injured or dead wolf.**

Specific incidents will have unique circumstances and responses are likely to vary from case to case to account for individual situations. The cooperating agencies will coordinate their responses to the various wolf management situations as they arise. If wolf activity is discovered within or adjacent to tribal lands, government-to-government discussions with the affected Tribe will be initiated.

### **1. Unconfirmed Reports of Wolf Activity (Tracks or Sightings)**

USFWS, WDFW and other agencies occasionally receive reports from people who have observed either large tracks or large animals that they think may be wolves. The response procedure is to interview the caller and fill out the observation form that documents details on the observation and where it was located. This information will be stored for future reference.

### **2. Verified Wolf Activity (Without a Depredation or Conflict)**

- Wolf activity in Washington will be considered verified when a State, Federal or Tribal wildlife biologist has been able to see and, to the extent possible, conclusively identify a wild wolf in the field. If current, highly credible reports are received from another source, or if multiple credible reports are received from the same area, appropriate personnel may be sent out to the area to verify it. If there is uncertainty about the identification, wolf experts may be brought in to assist in the confirmation process.
- If wild wolves are confirmed to be present and the animal(s) has not been implicated in a livestock depredation or other problem incident, USFWS, WS and WDFW will collaborate to monitor the wolf activity to the best of their ability, given available resources. Tribal wildlife agencies may also participate in monitoring activities. In addition, a WDFW local enforcement officer will coordinate with livestock producers in the local area to provide relevant information and what steps they may legally take to prevent depredation.

- The preferred monitoring approach is to capture and radio-collar wolves to facilitate regular tracking of movements. However, this can be difficult to accomplish with a lone wolf that is roaming across wide areas. Available funding and personnel may limit the ability to pursue this approach. Coordinating agencies would likely wait until there are multiple observations of wolf activity in an area – indicating the presence of one or more resident animals – before considering a concerted effort to capture and collar a wolf. A potential alternative approach would be to do periodic surveillance from the ground and air to document tracks and any observed wolf activity.
- The purpose of monitoring wolf activity, once verified, is to determine what areas wolves are using. Also, by knowing where the wolves are located, the agencies may be able to anticipate problem situations and utilize non-lethal techniques to prevent or reduce conflicts. If problem situations do occur, the presence of radio-collared animals will increase the efficiency of subsequent actions.
- Both confirmed and unconfirmed reports of wolf sightings should be mapped, and reports stored by the agency wolf point of contact in their respective offices.

### **3. Report of Possible Wolf-Caused Depredation on Livestock or Other Domestic Animals**

WS is the lead Federal agency for animal damage control and, when authorized by USFWS, will implement wolf control actions in Washington. When a report is received claiming that a wolf has attacked livestock (for example, cattle, sheep, horses, mules, and livestock herding or guarding animals such as dogs, llamas, and donkeys) or other domestic animals, agency response will include the following elements:

- WS investigates. Keys to a successful response include:
  - WS personnel are rapidly notified and respond promptly and determine whether or not it is a wolf depredation.
  - There is prompt coordination with the affected livestock producer to secure the scene.
  - Key individuals in USFWS and WDFW are promptly notified, including USFWS Office of Law Enforcement and WDFW Enforcement.
  - There is coordination between USFWS, WDFW, WS, and landowner to plan possible follow-up actions.
- If the WS investigation determines that the depredation was wolf-caused, a response action will be initiated. Site-specific circumstances will dictate what type of response action will be used.

### **4. Report of a Wolf Capture**

Wolves may be caught in traps or snares set for other animals. If a captured wolf is healthy, the responding agency will consult with partner agencies prior to initiating an action. Site-specific circumstances will influence how such captures are handled; however, a rapid response and decision will be necessary to ensure the health and well being of the animal. USFWS Office of Law Enforcement should immediately be consulted in this situation (to make a legal determination about the capture, properly document the event, and initiate further action if necessary).

Factors that will be considered when responding to a wolf capture include the following:

- If there is no history of wolf problems in the area where the animal is captured, the preferred approach is on-site release. However, decisions regarding how to manage the issue will be made on a case-by-case basis. An evaluation will be made to determine if there have been any reported wolf problems in the area prior to making a release decision. Interagency coordination will be initiated to determine what should be done with the animal.
- If an on-site release is being considered, an evaluation of the animal's health will be conducted prior to release. If the wolf is injured, depending on the severity of the injury, a decision will be made on whether or not to release the animal. Female wolves with pups captured on public lands prior to October 1 should be released in the same area as capture unless there have been repeated depredations in the area.
- If the animal is collared and released, collaborating agencies will monitor its movements as regularly as possible.
- If a decision is made to hold the animal, arrangements will be made with an appropriate kennel facility and veterinary care will be arranged, if needed.

#### **5. Report of a Dead or Injured Wolf**

USFWS Office of Law Enforcement and WDFW enforcement personnel will immediately be called in to investigate all reports of dead or injured wolves and make a determination about the cause of death or injury, properly document the event, and initiate further action as necessary. The USFWS is responsible for investigating cases that involve unauthorized take of a Federally listed species. The WDFW is responsible for investigating violations of State wildlife laws.

When an injured or dead wolf is found, response will include the following elements:

- USFWS and WDFW Law Enforcement will be immediately notified and they will determine and control all subsequent aspects of the response.
- Keys to a successful response include:
  - Law Enforcement officers are rapidly notified and respond promptly.
  - Scene where the animal was found is left undisturbed and effectively secured.
  - Key individuals in various agencies are promptly notified.
- If an injured wolf is found, actions will be taken immediately to stabilize its condition. Interagency coordination will be initiated to determine what should be done with the animal. Depending on the severity of the injury, a decision will be made on whether or not to release the animal.

## **RESPONSE STRATEGY AND CHECKLISTS**

Response checklists have been developed for each of the five potential wolf situations listed above to facilitate a smooth and organized response:

### **1. UNCONFIRMED REPORT OF WOLF ACTIVITY (TRACKS OR SIGHTINGS)**

#### **Recipient of report:**

Take caller's name and call back information.

Contact the appropriate USFWS or WDFW office.

The USFWS or WDFW will interview the person(s) reporting the sighting and record all relevant information regarding the sighting on the appropriate form and mark the location on a map.

When warranted and resources are available, the WDFW or its designated agents will conduct a follow-up field investigation to try to determine if wolves are in fact in the area, particularly when multiple credible reports come in from the same area.

### **2. VERIFIED WOLF ACTIVITY, WITHOUT A DEPREDACTION OR CONFLICT**

If the presence of wild wolves is confirmed, and there has not been a livestock or domestic animal depredation or other problem incident, the first recipient of the information will respond as follows:

#### **Recipient of report:**

- Take caller's name and call back information.
- Document the specific location(s) where activity has been observed.
- Contact the appropriate USFWS or WDFW office.

#### **Agency Roles and Responsibilities**

WDFW will investigate verified wolf sightings and monitor wolf activity.

USFWS may assist WDFW with investigating verified wolf sightings and monitoring wolf activity.

Wildlife Services personnel may provide assistance in trapping efforts for radio-collaring wolves.

1. The agencies will coordinate and share this information with all other appropriate agencies, e.g. USFWS or WDFW, WS, US Forest Service, BLM, National Park Service (NPS), and Washington Department of Natural Resources (WDNR).

2. If wolf activity is within or adjacent to Tribal lands, the USFWS office involved will share this information with the affected tribe.
3. All media inquiries should be referred to USFWS External Affairs contact Doug Zimmer, and WDFW Public Affairs contacts Madonna Luers (Spokane, east of the Cascade Mountains), or Margaret Ainscough (Olympia, west of the Cascade Mountains).
4. WDFW local Enforcement Officers will provide information updates to livestock producers in the area and describe what they can legally do to discourage wolves from frequenting their property or grazing allotment.
5. Monitoring of wolf activity will be coordinated among USFWS, WDFW and WS, using one or more of the following three approaches:
  - Compile information and map locations of sightings of animals and tracks through interviews with persons(s) reporting activity.
  - Conduct periodic ground surveys (i.e., scat and track surveys, howling surveys) and/or flyovers to monitor wolf activity.
  - Use radio-telemetry to regularly track collared animal(s).

### **3. REPORT OF POSSIBLE WOLF-CAUSED DEPREDACTION ON LIVESTOCK OR OTHER DOMESTIC ANIMALS**

#### **Recipient of report:**

Take caller's name and call back information and advise the caller to protect the scene. Ask for specific directions on how to reach the scene (street names, landmarks, gates, etc).

Give the caller the following instructions to protect the scene:

- Avoid walking in and around the area;
- Keep dogs and other animals from the area to protect evidence;
- Place tarp over carcass;
- If possible, use cans or other objects to cover tracks and scats that can confirm the depredating species;
- Inform caller that a Wildlife Services investigator will be notified of the incident.

Immediately contact the appropriate USFWS or WDFW office.

#### **Agency Roles and Responsibilities**

Wildlife Services is the lead agency for investigating livestock depredations and making the determination on cause of death.

1. USFWS, WDFW, or WS will interview the person(s) reporting the incident and record all relevant information regarding the incident on the appropriate form and mark the location on a map.
2. USFWS or WDFW will contact WS and relay the information provided by the caller and request that an investigator be dispatched to the scene.
3. The responding agency will coordinate with WS, WDFW, USFWS, and the livestock owner, as needed, to ensure someone responds and that the owner is kept informed.
4. The agency will notify law enforcement, and all other appropriate agencies (e.g. US Forest Service, BLM, NPS, WA DNR).
5. If wolf activity is within or adjacent to Tribal lands, the USFWS office involved will work with the affected tribe.
6. All media inquiries should be referred to USFWS External Affairs contact Doug Zimmer, and WDFW Public Affairs contacts Madonna Luers (Spokane, east of the Cascade Mountains), or Margaret Ainscough (Olympia, west of the Cascade Mountains).

**If Wildlife Services Determines that the Depredation was Wolf-Caused:**

1. USFWS, WDFW, and WS will coordinate and consult with designated agency managers to evaluate possible response actions, assess the efficacy of non-lethal measures and document that process, and determine the appropriate response measure.
2. USFWS, in coordination with WDFW and WS, will authorize a course of action, with notification to USFWS and WDFW Law Enforcement prior to action being taken.
3. WS will implement the response efforts under the direction of the USFWS. WDFW may assist if conditions warrant.
4. WDFW local enforcement officers will provide information updates to livestock producers in the area and describe what they can legally do to discourage wolves from frequenting their property or grazing allotment.

**4. REPORT OF A WOLF CAPTURE****Recipient of report:**

Take caller's name and call back information and get detailed description of the incident location from the caller. Ask about specific directions on how to reach the scene (street names, landmarks, gates, etc), provide them with instructions on what to do until someone arrives, and inform them that USFWS or WDFW personnel will respond to the scene immediately.

Immediately contact the appropriate USFWS or WDFW office.

**Agency Roles and Responsibilities**

WDFW will respond to wolf captures.

USFWS may assist in responding to wolf captures and will coordinate with WDFW and WS to decide on what course of action to take.

Wildlife Services may assist if conditions warrant.

1. The responding agency will interview the person(s) reporting the incident and record all relevant information regarding the incident on the appropriate form and map the location.
2. An agent from WS, or a biologist from WDFW or USFWS will be dispatched to confirm that the captured animal is a wolf and to evaluate the animal's condition.
3. If it is confirmed that the animal is a wolf, contact USFWS Office of Law Enforcement and advise them of the circumstances as soon as possible.
4. Initiate interagency coordination to determine what should be done with the animal. Depending on the severity of any injury to the animal, a decision will be made on whether or not to release the animal.
5. Upon the USFWS Office of Law Enforcement's determination that information can be released (if a wolf), the responding agency will notify all other appropriate agencies (e.g. US Forest Service, BLM, NPS, and WA DNR).
6. If wolf activity is within or adjacent to Tribal lands, the USFWS office involved will work with the affected tribe.
7. If the decision is to release the animal on site, WDFW Enforcement officers will provide information updates to livestock producers in the area and describe what they can legally do to discourage wolves from frequenting their property or grazing allotment.
8. In USFWS Office of Law Enforcement matters, refer media inquiries to the Redmond Office of Law Enforcement. In non-law enforcement matters, refer all media inquiries to USFWS External Affairs contact Doug Zimmer and WDFW Public Affairs contacts Madonna Luers (Spokane, east of the Cascade Mountains), or Margaret Ainscough (Olympia, west of the Cascade Mountains).

**5. REPORT OF A DEAD OR INJURED WOLF****Recipient of report:**

Take caller's name and call back information and advise the caller to secure the scene. Ask about specific directions on how to reach the scene (street names, landmarks, gates, etc).

Give the caller the following instructions to protect the scene:

- Treat area as a potential crime scene.
- Do not touch anything and keep all people and animals from the area.

- A tarp can be placed over the wolf carcass.
- Cans or other items can be placed over footprints and animal tracks.

Immediately contact the appropriate USFWS or WDFW office.

### **Agency Roles and Responsibilities**

WDFW will respond to reports of dead or injured wolves.

USFWS will make decisions on euthanasia of injured wolves.

WS may respond to reports of injured wolves.

1. USFWS or WDFW will contact caller to get a detailed description of the incident location.
2. USFWS or WDFW will notify USFWS and WDFW Law Enforcement, relay information provided by the caller, and request that an officer be sent to the scene.

**IF THE WOLF IS DEAD:** USFWS Law Enforcement personnel will take over the investigation and determine all subsequent aspects of the response. If there is an ongoing law enforcement investigation, refer all media inquiries to USFWS Office of Law Enforcement, Redmond.

### **IF THE WOLF IS INJURED:**

1. Dispatch a USFWS, WS or WDFW biologist to the scene to evaluate the seriousness of injuries and recommend further action and continue coordination with USFWS law enforcement agent and on-site person.
2. With USFWS Office of Law Enforcement concurrence, the USFWS and WDFW will notify all other appropriate agencies (WS, US Forest Service, BLM, NPS, and WA DNR).
3. Interagency coordination will be initiated to determine what should be done with the animal. Depending on the severity of the injury, a decision will be made on whether or not to release the animal.
4. If wolf activity is within or adjacent to Tribal lands, the USFWS will work with the affected tribe.
5. If there is an ongoing law enforcement investigation, refer all media inquiries to USFWS Office of Law Enforcement, Redmond. Otherwise, refer all media inquiries to USFWS External Affairs contact Doug Zimmer and WDFW Public Affairs contacts Madonna Luers (Spokane, east of the Cascade Mountains), or Margaret Ainscough (Olympia, east of the Cascade Mountains).

## **Attachment A: Phone Contacts to Report Wolf Observation, Injury, or Suspected Depredation**

### **U.S. Fish and Wildlife Service, Monday through Friday, 8:00 – 4:30 (except federal holidays):**

#### **Eastern Washington:**

Wenatchee.....(509) 665-3508

#### **Western Washington:**

Lacey ..... (360) 753-9440

USFWS Office of Law Enforcement to report dead or injured wolves:

Spokane ..... (509) 928-6050  
 Lacey ..... (360) 753-7764  
 Redmond ..... (425) 883-8122  
 Bellingham ..... (360) 733-0963  
 Burbank (Tri-Cities)..... (509) 546-8344  
 Portland ..... (503) 780-9771

### **USFWS Office of Law Enforcement after hours:**

Call Washington State Patrol Office (425-649-4370). Tell dispatcher which county is involved and ask to be connected to a USFWS Special Agent.

### **Washington Department of Fish and Wildlife, Monday through Friday, 8:00 – 5:00:**

Spokane ..... (509) 892-1001  
 Ephrata ..... (509) 754-4624  
 Yakima ..... (509) 575-2740  
 Vancouver ..... (360) 696-6211  
 Mill Creek ..... (425) 775-1311  
 Montesano ..... (360) 249-4628  
 Olympia ..... (360) 902-2200

### **USDA Wildlife Services, Statewide, Monday through Friday, 7:30 – 4:00:**

Olympia ..... (360) 753-9884

#### **For Emergency and after-hours:**

Contact your local State Patrol Office and ask to be connected to a local WDFW wildlife officer.

**Washington State 24 hr Wolf Reporting System..... (888) 584-9038**